The American horologist and jeweler

INCORPORATING HOROLOGY
THE NATIONAL MAGAZINE
FOR ADVANCEMENT IN TIMEKEEPING

19 December, 1952 No. 12

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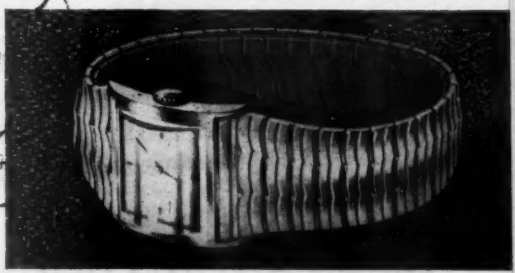

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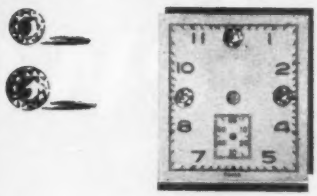

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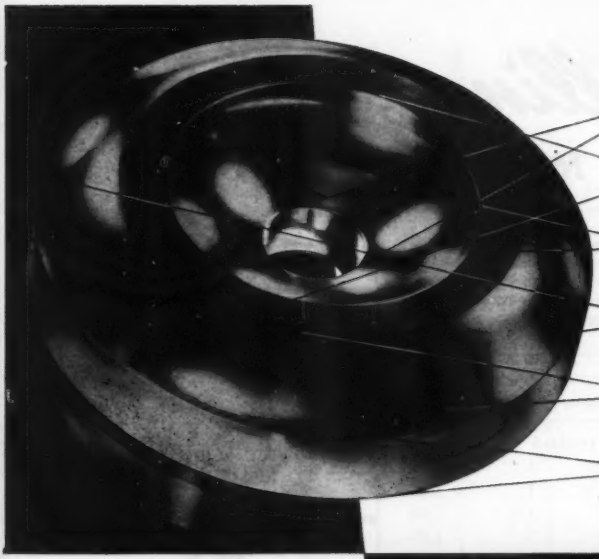


1 HOLE round, stra… polished, pre… diameter

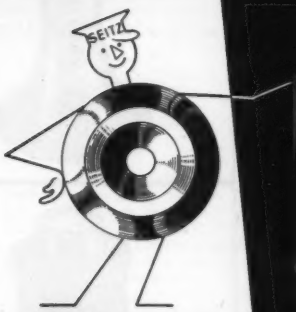
2 OIL CUP well po… ed

3 UPPER FACE flat … regular

4 DIAMETER accur… to ½ hundr… of mm.

5 BEVEL convex … polished

6 RIM of uniform … height



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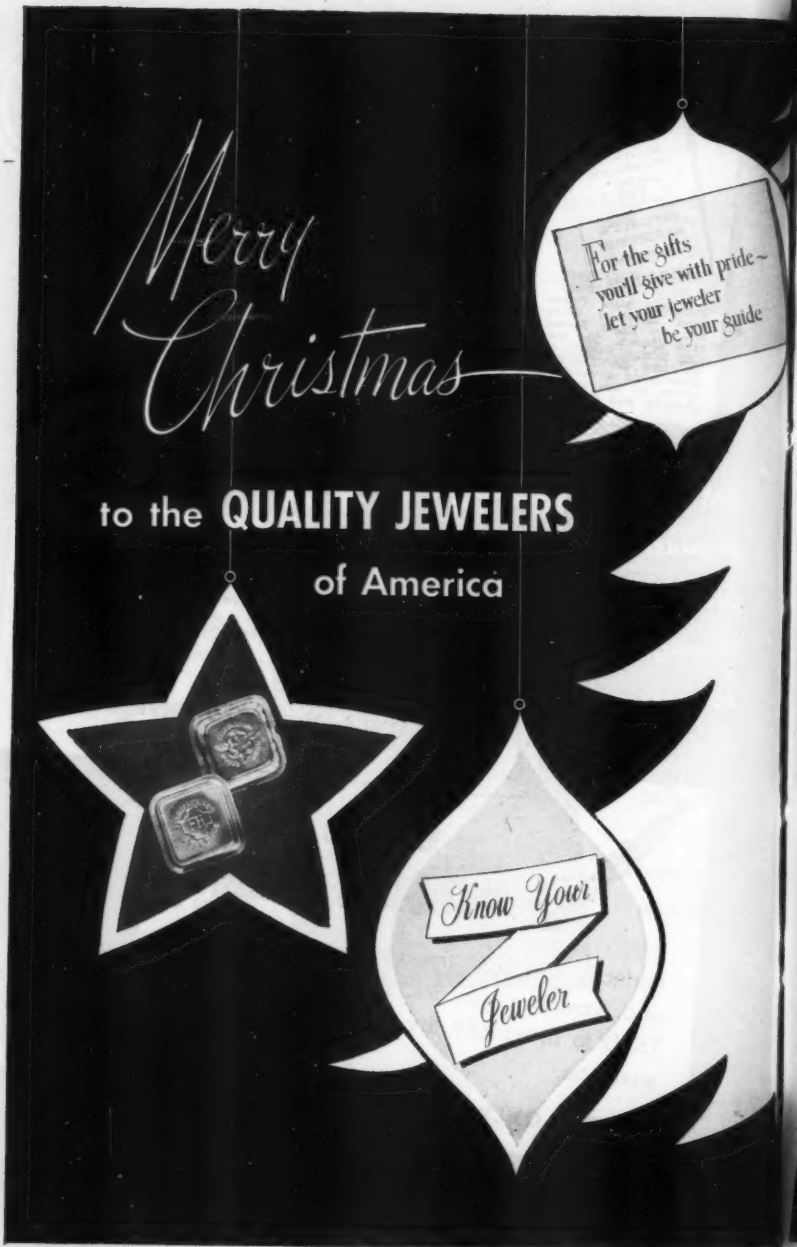
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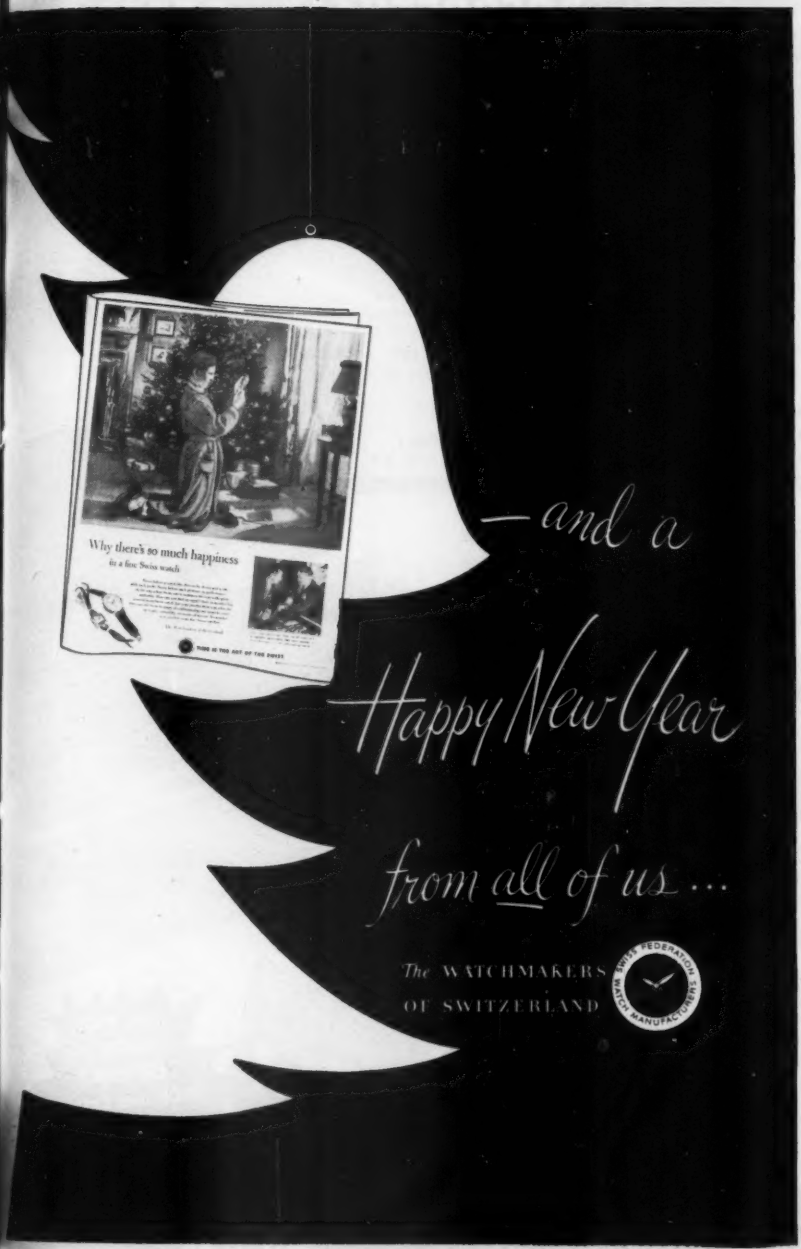
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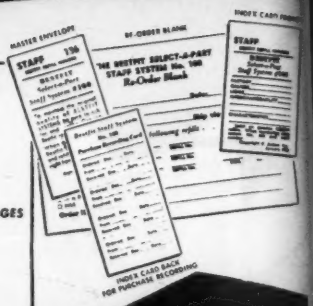

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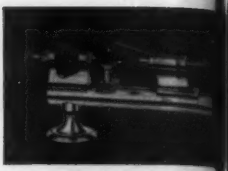

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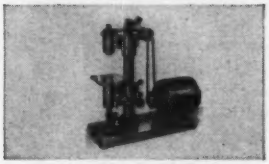

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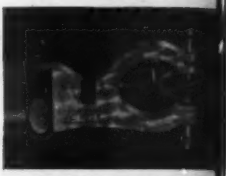

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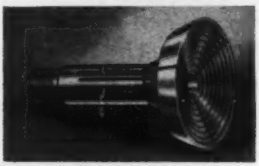

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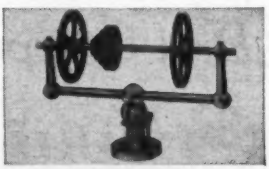

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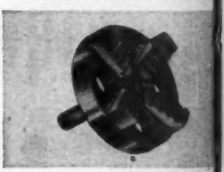

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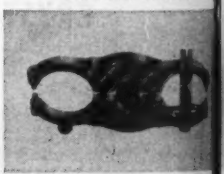

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The American horologist and jeweler Incorporating Horology

Volume 19 December, 1952 No. 12

THE BALANCE SPRING

A Prize Essay by Moritz Immisch

Part II

WE have already seen above that the relative force of the spring is inversely as the square of the diameter; a balance, therefore, of half the diameter of another would require four times the weight of the large one for the same number of vibrations. Here we have four times the weight projected half the distance of that of the large one, and in the case of the latter we have one-quarter the weight projected only double the distance of the small one; and as in both cases the relative force of the spring remains the same, it follows that the smaller balance has double the capacity of accumulating and retaining any force transmitted to it, and will consequently cross further. If therefore a certain arc of vibration is to be obtained with a given mainspring power, quicker vibrations will require a smaller and heavier balance, and a larger and lighter one will be necessary for slower speed. It is a rule, established by practice and experience, that for marine chronometers the arcs should be one turn and a quarter; it has been demonstrated that with this arc magnetism has no influence on the rate of going, retardation and acceleration counterbalancing each other in each vibration exactly.

With that kind of dead-beat escapement where the friction remains active throughout, as in duplex and horizontal watches, the gyration is of course much less, and here it is imperative that attention should be paid to a proper proportion of weight and diameter of the balance. In the case of a horizontal watch no amount of change in the balance spring will make long and short vibrations equal, if these proportions are incorrect. The friction on the sides of the cylinder is a given factor, and must be turned to a proper account; the gyrations being small in themselves, the arc of escape bears a large proportion to the whole extent of the vibration. During this arc of escape there is no side pressure against the cylinder, and a stronger impulse will consequently propel the balance forwards with a greater velocity. This increase during the arc of escape in a properly-constructed watch will be compensated for by the increased friction on the cylinder. If a balance is too small and too heavy it is clear that its greater momentum will overcome this friction easier, and so neutralize the equalizing effect it would otherwise have had. If follows if a horizontal watch gains with increased motive force, the balance is too small and too heavy. By making it lighter and putting a weaker spring a change is certainly effected in the

WAKMANN WATCH WAYS

Logic Is Always on the Side of the Angels

By Icko Wakmann

A certain young man, in college, fell in with a group. Eternal loyalty these classmates swore to each other: never would their cooperation end! In time, the group graduated, scattered, married. It happened so to the young man—and it happened also that one evening the young man failed to return home on time.

Hour after hour, the young man's wife waited. Finally, to each of the young man's friends, she dispatched a telegram. Back came 9 replies: "George is spending evening with me." The young man's wife sat down to wait some more. At 4:30, in marched George. He had been called out of town, he said—and his car had broken down. George's wife handed him the telegrams. "My!" answered George, **"That's cooperation!"**

I have never been asked for George's type of cooperation! But **business** cooperation you will always get from Wakmann! Do your customers demand the unique? Try our self-winding Skelomatique wrist watch, with **transparent** back. Through this rear window, your customer can see the 17 jewel gilt Incabloc movement **in action.** Ask jewelers who stock the Skelomatique. **They** can tell you what profits this beautiful gold-filled model will make for you.

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right direction; but as any change in the motive force will bear too great a proportion to the absolute power of percussion in a slight balance and spring, any diminution will cause the vibrations to fall off considerably; any outward influence, as thickening of the oil, and imparted motion, will also influence the going of the watch to an undue extent. There is in a large and light balance not that alertness which we find in small and heavy ones, and the wear on the edges of the cylinder is certainly greater, but it has the important advantage of greater steadiness. In a watch having an escape wheel of fifteen teeth making 18,000 vibrations in an hour, the extreme edge of the balance should just reach up to the tooth of the wheel, and the weight be so proportioned that, being clean and fully wound up, it should make a little less than two-thirds of a turn. With slower vibrations the size must be increased proportionately.

In a duplex watch the friction is much less; but as it continues throughout, a change of the momentum of the balance would also considerably affect the long and short vibrations. This escapement affords a facility of altering the proportions of the impulse velocity to the friction in the remainder of the vibration. If the angle formed by the pallets and the notch in the roller is lessened, the drop is increased, and the impulse power so lessened causes not only the vibrations themselves to fall off, but also the smaller ones to be slower than the large ones.

The following rule will be a guide in conducting experiments:—All alterations which increase the arc of vibration without changing the amount of friction will make the long vibrations slower than the short ones. If the impulse power remain the same and the friction is increased, the long vibrations will be quicker than the short ones, inasmuch as to a smaller arc of vibration the same increase of friction bears a greater proportion than to a larger one.

If in a duplex watch the balance holes are too large and the balance is brought into such a position as to bring it into a closer proximity with the escape wheel, the long vibrations are sure to be quicker

than the small ones; for two reasons, firstly, on account of increased friction on the roller; and secondly, in consequence of the greater drop in the escapement. The difference caused by greater or less drop will be the same whether the momentum of the balance is great or small, while that caused by the change in friction on the roller will be considerably influenced by the momentum of the balance. We also find that if the balance holes are large, a considerable difference arises in the rate of going in the four vertical positions. The pressure of the wheel against the roller is never directed to the centre of the latter, but acts obliquely, and if, according to what position the balance is in, it becomes more or less so, it will cause a variation of friction in the pivots in different positions; though it is less in amount than that on the roller, it is extremely inconvenient, as its variable effect can never be entirely compensated for. It is therefore of great importance in a duplex watch that the holes should fit exactly. When the escapement is set out of beat, the point where the vibrations are quickest does not correspond with the centre of the arc of escape, and therefore such a change will have an influence on isochronism; but of course this cannot or ought not to be done, as it would make the escapement imperfect.

In a duplex watch the friction on the roller is sufficient to exercise a proper control over the momentum of the balance, and consequently the latter becomes liberated and gets more free in its action when the motive power relaxes. The balance is, on the other hand, sufficiently independent of the friction to allow the properties of the balance spring to be brought into play. Those circumstances combine to make the general performance of duplex watches very satisfactory. In lever watches and chronometers the motion of the balance is, except during the arc of escape, unfettered by any escapement friction, and the properties of spring and balance have their full sway.

We have already seen that a change in the momentum can not be resorted to with advantage to procure isochronism; and as by means of a spring it can be obtained with the utmost precision, this mode is invariably employed.

An opinion exists amongst a great number of watchmakers that isochronism is arrived at when the angle of inflection corresponds exactly with the force of the spring, but by what we have already seen this cannot be correct. If apart from the momentum of the balance (which certainly plays an important part in this respect) any *change* of drop or friction influences isochronism, *the unavoidable and given friction and drop must therefore be factors and agents of more or less importance when the isochronous state is obtained.*

Before I describe and explain the nature of the manipulations necessary to obtain isochronism, a few general observations will not be out of place.

If a piece of spring, say part of a mainspring, is fixed at one end with its concave side upwards, a weight will draw it lower down than when the convex side is upwards, therefore when a balance spring is inflected towards that side where the coils recede from the centre, it would oppose less resistance to the balance than on that side where they advance towards it, and the halves of the vibrations would be unequal in length if this was not counterbalanced by the circumstance that the strain of the cohesive power of the corpuscles composing it is greater here than when it is inflected the other way; supposing a spring to have three turns; when inflected one whole turn to make the coils expand, the turns will only be two; when inflected the other way one whole turn, the turns will be four, and therefore as 3:2 is a larger proportion than 4:3, the spring had in the former case to expand more than it had to contract in the latter.

If the above experiment with the piece of spring is continued (the convex side being upwards), it will be seen that in the beginning the spring bends closest to the centre, but farther on (supposing the bending force always to act in a rectangular direction to the tangent of the extremity of the free end) the form will soon become of an oval shape, and if the spring should break now, it would not be at the point of fixture, but at the point farthest from it. Had the spring broken at the beginning of the experiment, it would have been much nearer to the fixing point. This experiment, rude as it is, proves that the point of the greatest strain moves away

from the fixing point when the spring contracts, and approaches towards it when it expands. This is exactly what takes place in every spring. In the case of a flat spring, that strain is modified by the relative position of the ends. The following experiment, which can easily be repeated by anyone, will prove this beyond a doubt.

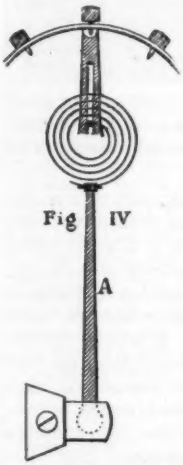

Fig IV

I fixed the outer end of a spring of five turns to a movable stud or lever (A, Fig. 4), turning on pivots at some distance from the spring. One of the balance arms had a long notch in it to receive a stud in place of the collet, to which the inner end of the spring was fixed, and which could be easily moved to and fixed at any distance from the center. In setting the balance in motion, the lever, of course, moved to and fro, turning on its pivots always in the same direction as the balance moved, no matter whether the spring was fixed as in the drawing or the reverse way. I found the lever A to move very differently according to the relative position of the ends; sometimes equally to and fro, sometimes much more when the spring expanded than when it contracted. These differences were about the same in each coil, provided the relative positions of the ends were the same, only they were more conspicuous as the spring got shorter. The greatest deviation of the lever I found when the ends were fixed about half-way, making 4½, 3½, and 2½ turns.

In tapering the outer coil of a similar spring towards the end, the movement of the lever became much less, because here the point of the greatest strain was confined to the immediate neighbourhood of the fixing point. It follows that the greatest deviation of the lever from its quiescent position denotes that the greatest strain is as far from the end as it possibly can be. These imperfections, if I may so call them, are made use of to procure isochronism in flat springs.

If the strain is too near the end at the commencement of the vibrations, there is not sufficient room for it to advance farther, the cohesive power of the particles of the extremities of the spring will be overstrained when the vibrations get larger, causing them, of course, to be quicker.

On the other hand, when the strain at the beginning of the vibration is farther from the end, it has more scope to travel forward, the momentum of the balance will be more powerful (comparatively speaking) in long vibrations, the point of rest before the return of the balance will be prolonged, and, consequently, the long vibrations will be slower. There is, therefore, a certain relative position in every flat spring where the long vibrations are slowest, and another where they are quickest, but whether the difference between the two is sufficient to meet the exigencies of the case, is another question, and depends on the conditions considered at length above. That difference, as we have seen in this experiment, decreases with the length of the spring, and it is found by practice that it *increases* with the proportion in which *the distances of the coils from each other are tapering towards the centre.* In a very long spring where these distances are equal it is very small. If, as is usually the case, index and curb pins are used to bring the watch to time, this, of course, alters the isochronal properties of the spring. Curb pins can therefore be used to procure isochronism if timing screws are used for rating the watch, but this can only be done within comparatively narrow limits, as when the curb pins are too far removed from the stud, the unemployed end will slightly move in a contrary direction to that of the spring, and as this movement is caused by the strain of the employed part, it will in its turn affect the vibrations. The differences arising out of such a compound motion have no definable limits, and must therefore be avoided.

In any alteration of the spring effected for the purpose of making the long vibration slower, the weight of the balance should be altered. It is best to operate on

a pair of small screws close to the rim of the balance; the changing of the diameter sometimes entirely destroys the beneficial effect the lengthening or shortening of the spring would otherwise have had.

A greater or less tapering of the distances towards the centre will vary the relative positions of those points where the difference between long and short arcs is greatest, and these relative positions must be found out in each case.

A flat spring should have about eleven turns. If shorter, it must be harder in proportion, on account of the greater strain. The distance of the coils farthest from the centre should be about twice greater than the innermost ones.

Formerly springs were often made tapering to procure isochronism. This mode was first employed by Berthoud, and there is no doubt that isochronism must be obtained by that means if the taper is properly proportioned; but the difficulty in the way of making these springs has brought them into disuse.

In Breguet springs isochronism is obtained by bending the outer end, and in cylindrical or helical springs by bending both ends into curves towards the centre.

By what has been said in the case of the flat spring, it will be extremely easy to understand the nature of the change effected by this manipulation. If we compare the inner coils of a flat spring with the outer, and try to bend them by opposite central forces, with a pair of tweezers, for instance, we find that the outer coils give way much easier, which proves that the smaller have a greater degree of rigidity; by bending the outer turns towards the centre, therefore, we impart more rigidity to the end, causing it to oppose a greater resistance to a bending force, so that when the vibrations are small the greatest strain is farther from the centre, and the same argument I advanced in the case of a flat spring remains here in full force. It stands to reason if the curve is too abrupt the length to which this greater rigidity is imparted is shorter; if the curve is more gentle, beginning farther from the end, the greatest strain will be farther from, and will be enabled more gradually to advance towards, the fixing point.

If therefore, the watch loses in long vibrations, and the curve of the spring should have the form A (Fig. 5), it will have to be changed to a form approaching B; and if it gains in long vibrations the curve must be begun farther from the end, approaching the form C.

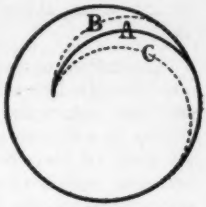

Fig. 5

It is evident that a helical spring having both ends turned in offers a larger scope for operation than the Breguet spring. Both, however, have the important advantage in common that they emancipate the balance from the side pressure of the pivots in their holes.

The outer end being fixed within the circle of the spring, and the curve itself expanding, the free end of the curve, which is also the commencement of the circular coil, is enabled to recede from, and to advance towards, the centre, according to the direction in which the balance is moved, while when the extreme end of the last circular coil is fixed the expansion and contraction is one-sided, causing a side pressure in their holes; we can, therefore, with a Breguet or cylindrical spring, obtain a greater arc of vibration with a smaller amount of motive force.

In the case of spherical springs, a greater rigidity is given to the ends, not only by the smaller diameter of the outer coils, but also by the different inclinations which the flat sides of the spring have to the plane of the motion. It is only the centre coil the sides of which are exactly rectangular to the plane of motion, and will therefore be affected most.

The isochronal adjustment of this spring consists in lengthening and shortening it, and bringing the watch to time by altering the balance in the manner described above.

This spring stands in the same predicament as the tapering flat one, and as no particular advantage attaches to this form which would compensate for the greater difficulty in making it, it is very seldom resorted to, and belongs to the class of fancy forms, if I may use this expression.

We see that in all these different forms the principle of adjustment of isochronism

is the same, although the manipulations differ.

The motion of a spring may be imagined as a struggle between the body of a spring and the extremities. Although when the spring is inflected *all* the coils bend, it is in point of fact the resistance of the extremities which checks the force of the momentum of the balance. It stands to reason that in order to have the greatest strain at the proper distance from the centre the absolute elastic force of the body of the spring must be exactly even throughout its whole length, or (in the case of flat springs) e x a c t l y proportionate to the length, because if this proportion is not even, and there should be a weak place in any part of it, the greatest strain would be *there,* and not where it ought to be, and any change effected in the extremities will be more or less ineffective. It is therefore of the utmost importance that the degree of hardness should be absolutely uniform throughout the spring. Care should also be taken that the body of the spring should not get bent, as the rebending it to its former position causes an unevenness of the texture of the metal. The unevenness caused by such a proceeding will be greater when the material is soft.

If we bend a piece of metal and try to bring it back to its former shape, it will bend in a different place: everybody knows how difficult it is to straighten a pin when it has bent. If a spring has been bent and it is *forced* back into its original position, the elastic force will be diminished at the point so forced. The mere fact of bending it in the first instance has an effect detrimental to its elastic quality. It is, for instance, well known to watchmakers, and many have found it out to their trouble, that the bending of a gong wire in a repeating watch, in order to free it from any point it touched, diminished the sound considerably, and heating the spring would only partially restore the tone. The best way to proceed in such a case is this: if the spring touches on the outside and must consequently be bent inwards, it should be, at the place where it is to be bent, laid upon a convex piece of brass corresponding in shape with the inner side of the spring; then if the outside be slightly hammered with the sharp edge of a hammer the small indentations produced will cause the outside to be lengthened a little and the inside to contract in proportion. The change of form will be very gradual, and the granular disturbance, being spread over a larger area, will not be great enough to affect the tone in the least. The more a spring is bent to and fro in any direction the more it will lose its elastic force. It is for this reason that a beginner will often spoil a spring by over-manipulation, making it ultimately unfit for isochronal purposes. Especially in soft springs care should be taken to make any change very gradually, and rather oftener than too much at once, and thereby necessitating the bending back of the spring. If quite a soft spring, perfectly adjusted, should be bent and brought back again to exactly its former position, the vibrations would be isochronous no more, and by repeating the experiment the elastic force of the curve will become so small compared with that possessed by the body of the spring, that instead of exercising a control over the latter, its motion becomes subservient to it. A harder spring will bear a much greater amount of over-manipulation, and a Breguet spring, the form of which in itself necessitates a certain amount of bending, must always have a greater degree of hardness than that necessary for helical springs, in order that the advantage possessed by this form should be of the greatest possible use. It is also necessary that a certain time should elapse before ascertaining the result of the change effected.

All metallic bodies possessing some degree of elasticity do not, if forced into a different shape, retain the newly-acquired shape exactly, but have a tendency to return in some small measure towards that shape from which they have been forced. The reactionary force becomes gradually less active, until, after a time, it ceases altogether. The time required for the shape to become permanent differs greatly with the degree of elasticity. This time will be greatly shortened by the application of heat, and also by imparting some small motion. A great variety of experiments may be made to prove the existence of this most curious phenomenon.

A gong in a repeating watch, after the tone has been spoilt, will after a time,

especially if the watch is made to strike frequently, in a small measure improve its tone. This improvement will take place at once and in a greater degree if heat is applied.

There is no form more favourable to the display of this tendency than that possessed by balance springs and the acting parts of a compensation balance. If a compensation balance is bent outwards rather considerably, and the rate be noted down, say, after the first half-hour, and compared again somewhat later, say, after six hours, it will be found that at the second observation the rate is somewhat accelerated. While this change is taking place in the balance spring the isochronism is affected in a manner which is very deceiving, because it is not continuous. To bring this feature more directly under observation the following experiment can easily be made. Bend a part of mainspring (of about six inches in length) excessively, not by short bends in different places, but by a continuous twist between the fingers, and then bend it back again gradually and by short bends in different places till it forms a straight line; then fix one end firmly on a table, with its sides vertical to the plane of the table in such a manner as to allow the free end to vibrate freely in a horizontal direction; fix a small weight to it at a convenient distance, in order to make the vibration observable, mark the position when in rest by fixing a pin into the table outside the spring, and two other pins at *equal distances* from the spring. If the spring is inflected in that direction from which the last change has been effected in making it straight till it touches the pin, it will, on being released, not reach the opposite pin by far; in being as much inflected the other way and released, it will either reach the opposite pin, or at least approach much nearer to it, which proves that the resistance which the spring opposed to the momentum of the weight is greater on one side than on the other. Something of this kind takes place (of course in a very much smaller measure) in the balance spring after it has been altered, and it would be quite useless to ascertain the permanent effect of a change before the lapse of a certain time. In the case of a hard spring in a chronometer, a time of about three or four hours should be allowed.

In adjusting the spring of a watch in long and short vibrations, the short ones must be made to gain upon the long when placed horizontally, because it will be found that in the vertical positions the vibrations are smaller on account of the increased friction on the pivots, and the watch will lose; this retarding influence varies of course with the proportion the friction bears to the momentum of the balance, and must be compensated for in order to obtain good performance. In the case of marine chronometers, only the retarding influence of the thickening of the oil comes into consideration, and it has been found best to make the short vibrations gain upon the long ones about 6″ in 24 hours when the arcs are reduced from one and a quarter to three-quarters of a turn. The opinions of chronometer makers differ as to the amount, and this will always remain a weak point. Very often we find that, without any assignable reason, the oil corroded on some pivots much more than on others. In fact, it is seldom that we find the thickening taking place quite uniformly, and if it takes place more on the pivots of the wheels than on the pivots of the balance, the rate will be accelerated, and *vice versa.* There is no doubt that the use of constant power escapements would do away with this difficulty, whatever may be the objections against them in other respects.

There is a peculiarity of balance springs which is as important as it is vexatious, and which is the greatest obstacle in the way of correct time keeping. It is their different performance in different temperatures.

All bodies expand in heat and contract in cold, and if that was all in the case of a balance spring, it could easly be compensated for; but we find that, besides its getting longer, its elastic force also changes considerably in different temperatures. These changes take place in an increasing ratio, and this ratio itself varies and increases, with the degree of hardness possessed by the spring. The compensation balance commonly used to correct this error in the spring is also irregular in its motions, inasmuch as when the rims bend inwards the weights proceed more directly

towards the centre, and have a greater effect than when they bend outwards; and although this circumstance tends to lessen the fault produced by the spring, it does not do so sufficiently, especially with hard springs. If, therefore, a chronometer is adjusted in the middle temperatures, it will lose in both extremes. If adjusted for one extreme, the fault will be greater in the other. These irregularities combine to make the subject of compensation in heat and cold a very intricate one. The present essay has only so far to do with it as it involves certain properties of the spring.

By what has been said, it would appear that in determining the degree of hardness in a spring we have to choose between two evils.

A soft spring will be too short lived, and a hard one will be too capricious in its tendencies. The best plan therefore in this case is to choose a medium between extremes, and here practice and experience offers a helping hand.

There are different modes of making springs.

Common springs are made of hard drawn steel or gold wire (the latter variety being seldom met with), and the procedure is extremely simple. The wire is wound up and tightened with screws to a form corresponding to the size the spring is intended to have. The spring being tightened down, is subjected to a heat of such a degree as would cause steel to turn blue, after which it will retain its shape, but springs so made are not very durable compared with steel springs hardened in fire, and therefore the later mode is preferable.

The manipulation is also very simple.

In making a helical spring, the wire is wound upon a hollow cylinder, either quite smooth or furnished with grooves corresponding with the form intended to be given to the spring. The cylinder must never be thicker than about ⅛th of its diameter because if too thick it will, on being immersed, cool too slowly, to the detriment of the hardness of the spring.

When a smooth cylinder is used, the winding up of the spring is performed in the turns. After one end is fixed to the cylinder by a screw with a flat head, the wire is kept tight by a weight attached to the other end, and wound up till the cylinder is quite full.

Care must be taken that the run of the coils should appear to be even and continuous. So wound up and fixed by screws at either end, it is hardened in a thick iron box with a loose cover; the free space within the box, which ought to be about three times the diameter of the cylinder and somewhat deeper, is then filled with powdered charcoal mixed with some powdered ivory, and the whole is heated to a yellow heat, in which it must be kept about a minute in order that the heat should get well diffused and imparted to the cylinder through the charcoal, which is a bad conductor of heat. Then it should be taken out of the fire and be reversed over a vessel containing oil, the loose top and the cylinder falling into it, and the spring thus becomes hardened. Proceeding thus, the spring will be evenly hard throughout and never change its form, which sometimes happens when water is used instead of oil. Some makers wrap platina foil round the spring to exclude the air, and then the heating can be performed on a piece of charcoal by means of a blowpipe. For hardening, cold water must be used in this case. Makers using this mode assert that in consequence of the spring being in contact with metal on each side while being heated and cooled, the granular disturbance within the spring will be less, and a spring so made will soon cease to accelerate its rate, an imperfection to which all springs except very soft ones are more or less subjected. There is a degree of plausibility attached to this argument in favour of this mode. Every maker has his own ideas, but the very fact that amongst a number of springs made by any maker the performance of a few only exceed the average degree of excellence, proves that assertions of this kind must be received with more or less caution. It is my opinion that the proportion between the degree of hardness and the length of the spring is the principal consideration.

Some makers have the habit of hardening and tempering the spring and then trying whether it will suit the balance, and if the number of turns is between eight and twelve, they use it.

Nothing can be more injudicious than that. He should first make up his mind

about the number of turns he wants to employ (I should in no case recommend less than ten), and then temper the spring accordingly. If it does not suit the balance a different wire must be employed, or another spring made with another temper, less coils of course requiring greater hardness.

The great difficulty is that the change of colour is scarcely a sufficient guide for the degree of hardness in long springs, for in these low degrees a spring may be made considerably softer without being accompanied with a corresponding change in the colour.

A better plan is based upon the fact that a hard piece of steel will colour with a smaller amount of heat than a soft one. If two pieces of steel, a hard and a soft one, be put together on a bluing pan, the hard piece will be of a rich blue before the soft one becomes purple, and when a hardened piece which has already been blued twice, after having been whitened after each bluing, is brought to a rich blue colour the third time, it will require a degree of heat which would have made it (had it not been whitened twice) of a very pale blue colour. As the time when the rich blue colour appears can be easily observed, the number of times the operation is repeated will be indicative of the degree of hardness. If a spring having ten coils is blued six times, including the final bluing, it will have a suitable degree of hardness.

It is not necessary that the spring itself should be whitened each time, as the whitening of the screws fastening the wire to the cylinder will serve the same purpose. The spring before being finally blued and set to shape on a cylinder furnished with suitable grooves must be whitened with oilstone dust and wood, which is done partly in the turns and partly on a flat piece of wood fixed in a vise, and which is thin enough to go between the coils, to allow the sides or edges to be finished off. The necessary manipulations are so simple as scarcely to need more minute describing. In regard to fixing also, anyone having looked at another with any attention can hardly make a mistake.

The curves must be bent with a pair of tweezers made expressly for that purpose, and to be had at any tool shop.

Flat springs are wound up three at a time between a pair of platina plates, having three steady pins, and being screwed or pinned down to friction tightness, and so hardened.

The best flat springs are, before final bluing, set to shape on a disc having suitable grooves on its plane.

In conclusion, I shall say a few words on the subject of timing watches in positions.

Above all it is necessary that the frictional conditions in the pivots should be equalized as much as possible, inasmuch as, if too great a difference has to be counterbalanced by isochronal adjustments, any change in the extent of the arcs arising out of other than frictional differences (as change in the motive forces while the watch remains in the same position, and imparted motion) will cause the long vibrations to be slower. In order to equalize these frictions it must be increased when in the horizontal and diminished when in the vertical position as much as possible. In the former case the flattening of the pivots or shaping the ends so as to form a slightly-inclined plane (which latter manipulation causes the rubbing surfaces to act farther from the centre) will be necessary. In the latter case, thinness of the holes or a convex shape of the sides of the holes, and utmost finish of the pivots, will be required. The pivots should be conical in shape in order to be made thin without lessening their durability.

As far as regards the vertical positions, the greatest narrowness of the holes consistent with freedom of motion will be of importance. Very frequently differences arise in consequence of the incorrect form of the pivots. If they are not perfectly round, and are, for instance, of an oval shape, the going of the watch will be influenced in the same manner as if the balance was out of poise.

Figs. 6 and 7 will make that more clear. There is, of course, always a very small shake in the holes necessary on account of the oil, and when, therefore, such an oval-shaped pivot is in the position indicated by Fig. 6, its centre is farther from the lowest point of the hole than when it

Fig. 6

Fig. 7

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is in a position as in Fig. 7, and when the balance vibrates it gives way to the influence of gravity — it *falls* in each half of the vibration; the effect on the rate will be the same as if the balance was bottom heavy. If the long diameter of such a pivot is in a position as in Fig. 7, when the watch is in a quiescent state its effect will be the same as if the balance was top heavy. The existence of such an imperfection can be ascertained by changing the position of the roller or rollers on the balance staff. If the relative points of greatest differences change with the roller, they arise from the escapement; if they retain their position with respect to a given point of the balance, they arise from pivot imperfections, and it is best to change the staff at once. The balance should in all cases be perfectly poised. Any change in this respect is bad.

No other than general rules can be given, as practice and experience are necessary to enable the artist to account for and to correct differences of a more complex nature, because the smaller the error becomes the more difficult it will be to reduce it, and is much more trying to the reflective powers of the artist than errors of a coarser kind. There is still a wide field to be cultivated by all watchmakers who love their art, and although there are no more Government grants to be won by raising the standard of excellence of timekeepers, the object possesses so much intrinsic interest in itself as always to challenge an honourable ambition of the best in the profession, their exertions being stimulated in addition by the requirements of the present age of railways and telegraphs, where correct time becomes a question of greater importance every day.

Although it's a pretty sure thing that the fish don't care, a goldfish bowl that tells the time with unerring accuracy is being currently manufactured in Japan. The casual observer would never suspect the dual purpose of the clock because it looks exactly like a conventional fish bowl excepting for the fact that it's on a pedestal and has a cover. The former's just ornamentation but the latter tells the time via a circular scale. This revolves behind an indicator on the lid itself. The movement also revolves fake fish at the self-same time. They are inside the glass center, but the real thing can be kept here in water in addition.

The Crowning of a Queen

THE STORY is told that the first time baby Prince Charlie saw his mother, the young Queen Elizabeth, posing for a photographer in her diamond tiara, he chuckled and pointed and asked, "What's that funny hat, Mummy?"

When he sees his pretty "mummy" in her regal red velvet robes, wearing the Imperial Crown of State that flashes with nearly three thousand diamonds and carrying the scepter in her slender hand, his small head will probably be too full of wonderment for asking questions. But the picture of his mother on her Coronation Day is sure to stay with him so long as he lives.

The last reigning queen of Great Britain had no little boy to gaze on his mother with love and astonishment when she was crowned. Victoria was only eighteen and unmarried at her Coronation and her nearest living relative was her mother. The first Elizabeth was twenty-five when she was crowned four centuries ago. Never married, the "Virgin Queen," for whom the State of Virginia was named, had not even her mother to watch her take the throne.

Elizabeth II will be crowned at Westminster Abbey on June 2, 1953. Inside the great gray Abbey Church few Americans will witness the proceedings, although many will go as tourists and watch the Coronation procession from wooden grandstands. The rest of us will see the show on television, in newsreels and through pages of pictures in papers and magazines.

This will probably be the greatest Coronation pageant given any queen in British history. Four hundred years ago, the clergy were so divided over religious matters that one group of bishops boycotted the ceremony for "good Queen Bess" and the Crown was lowered onto her head, not by the Archbishop of Canterbury, but by the relatively obscure Bishop of Carlisle.

At the Coronation of Queen Anne, the poor lady was so crippled with gout that she had to be carried by chair in and out of the Abbey.

The ceremony for Victoria had its rough moments, too. The Coronation ring had been made too small and her tears flowed when it was forced onto her finger. The great Crown of St. Edward, on the other hand, plumped down around her ears and had to be carried on a pillow in front of her instead of being worn. To recover from it all, the little Queen

(Left) Elizabeth II in one of her newest photographs is wearing the diamond-and-pearl circlet of Queen Victoria. She also wears the diamond necklace which was the wedding gift of the Nizam of Hyderabad, and a bracelet from her husband, the Duke of Edinburgh. (Center) Elizabeth I was 25 years old when she was crowned in 1559. Elizabeth II will be 27 when she is consecrated with same age-old ceremony on June 2, 1952. (Right) Queen Mary in royal robes, wearing four of the magnificent gems from the mighty Cullinan, the biggest diamond ever mined.

spent her Coronation night giving her dog, Dash, a nice bath!

REHEARSED LIKE A PLAY

The coming ceremony will be well rehearsed with replicas of the royal regalia. The British Crown Jewels are the most valuable collection in any royal treasury. Including at least seven magnificent crowns besides scepters, orbs, swords, spurs, rings and bracelets, there are about sixty pieces all told. The total value has been estimated as high as $80,000,000.

Some of the individual gems, however, are virtually priceless. The historic Koh-i-noor is the most famous diamond in the world. The Black Prince's ruby, now in the front of the State Crown, has historic value quite apart from pounds and pence. In the Royal Scepter sparkles the Great Star of Africa, the biggest cut diamond in the world, weighing 530 carats—as big as a Seckel pear. Also, there's its sister stone, most often called the Cullinan II, which weighs 317 carats and was cut from the same huge diamond crystal that produced the Great Star of Africa and more than a hundred other finished gems. The Cullinan II is in the band of the State Crown, and the third and fourth pieces are in Queen Mary's Crown. No reigning house in Europe has such a collection of diamonds as this one enormous crystal produced.

COULD IT BE REAL?

The story of the finding of the Cullinan diamond is fact with all the excitement of fiction. It came from the Premier mine in South Africa, and was named for Sir Thomas Cullinan who had discovered the mine fully 300 miles from the diamond diggings at Kimberley.

Late one day in 1905, the mine superintendent, Frederick Wells, was making a last round of inspection. In the twilight, his eye caught sight of something imbedded in the wall of the mine pit about eighteen inches below the surface of the ground. When Wells looked closer, he thought it was too big to be a diamond; probably some of the boys had buried a piece of glass and were waiting to laugh at him. With exaggerated calm, he took out his penknife to loosen the stone. Then something happened: the steel blade of the knife broke against the "glass" without making a scratch! Wells gasped. Diamond is the hardest substance in the world. Steel, that would break or score glass, would be broken by a diamond without leaving a mark. He began to work furiously at the gravel with his bare hands and finally scooped out a stone as big as his clenched fist. Rushing to the mine office, he found that he had a diamond of 3,106 carats, nearly one and one-third pounds—more than three times the size of any diamond discovered before or since!

The value of the Cullinan was estimated at as much as $75,000,000. As a practical matter, it was insured for $2,500,000 whenever it was taken out from the bank. For a time, nobody could be found to buy it. Finally, the government of the Transvaal made an offer in order to present the gem to Elizabeth's great-grandfather, King Edward VII, on his birthday in 1907. When the work of cutting was done, Edward had the largest finished gem, the Great Star of Africa, mounted at the head of the Royal Scepter.

TWO CROWNS TO MAKE A QUEEN

Since the Coronation of Charles II in 1661, the British monarch has been crowned with two crowns. One is the historic Crown of St. Edward, used only at the Coronation; the other is the "Sunday" Crown, which former rulers sometimes wore to church and which today's ruler uses for the opening of Parliament and other state occasions. Charles II ordered his goldsmith to make ". . . two Imperiall Crownes sett with precious stones, the one to be called St. Edward's crowne wherewith the king was to be crowned and the other to be putt on after his coronation."

The young British goldsmith, Robert Viner, had outbid the jewelers and gem merchants of every principal court in Europe to get the royal commission for remaking the British regalia. Under the regime of Oliver Cromwell, the whole collection had been broken up and the jewels sold for what they would fetch. Even the ancient "massy gold" Crown of Edward the Confessor, with which all kings had been crowned since 1042, was melted down. Now, with the Restoration of Charles II, the regalia must be restored, too. Viner, with a list in hand, went among the nobles and merchants, buying

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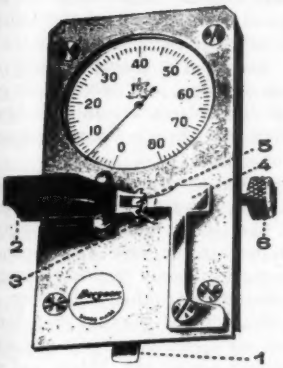

This is a simplified method of adjusting an escapement. With this tool, all that is necessary is to estimate the retouching to be done in hundredths of a millimeter and then simply advance or turn back the escapement jewel lever.

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back, wherever he could, the original stones of the old regalia. Then he duplicated the objects with such faith and dedication that Charles told him he did "a rare piece of work."

One day, the King was in Viner's shop and started to try on the Crown of St. Edward. The young goldsmith stopped him, horrified. "That, Sire," he cried, "is for the Bishop to do at Westminster!" The King is said to have laid the object meekly down.

The total cost of Viner's work on the regalia was supposed to have been about $160,000 But this was a mere beginning for Viner. He became the King's banker and lent him as much as $2,000,000 He was knighted, then made a baronet, and finally became Lord Mayor of London.

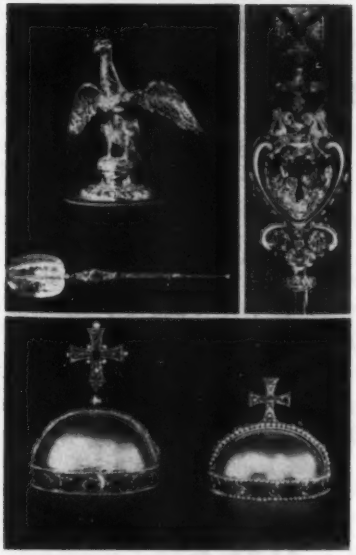
HISTORY IN A CROWN

Elizabeth II will have the Crown of St. Edward on her dark curls for only a few minutes. As a hairdressing sidelight, it is interesting that Elizabeth I wore her red hair flowing to her shoulders, although not all artists have depicted her that way, and Queen Anne wore an elaborate wig of long corkscrew curls.

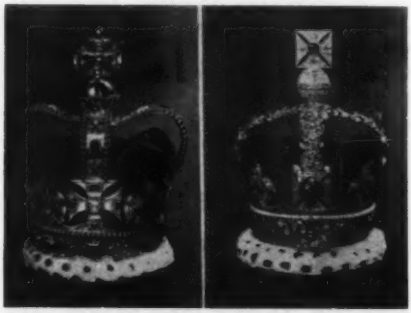
The present Queen might possibly have a new crown designed specially for her to use on ceremonious occasions. Leaving the Abbey after the Coronation, however, she will probably wear the Imperial State Crown. It is the most elaborate object in the regalia. It is based on a diamond circlet which belonged to Victoria. With slight alterations, it has been worn at all British Coronations since her time.

The magnificent gems in it cover nine centuries of history beginning with the great blue sapphire from Edward the Confessor's ring. Right in front is the famous ruby of the Black Prince, who got his name from the black armor he wore. The stone is actually a red spinel, but it has been called the Black Prince's ruby for hundreds of years. It was the gift of Don Pedro of Spain after the Black Prince had come to his aid with troops.

Another gem in the State Crown is the Stuart sapphire, which descended from the family of Mary Queen of Scots. The pearl eardrops of Elizabeth I also ornament it, and, most recent of all its great stones, the 317-carat cushion-cut diamond called Cullinan II.



(Upper left) Eagle ampulla and spoon of gold for anointing. (Upper right) Top of Scepter showing the Great Star of Africa, world's largest diamond. (Bottom) The Orbs with their crosses signify 'Christianity surmounting the globe.



(Left) Historic Crown of St. Edward, with which all British monarchs are crowned. (Right) The Imperial State Crown, with arches slanting upward, an insignia of empire. This is the most valuable royal crown in existence.

The arches of the Crown, without which it is considered just another jeweled bandeau, are formed of diamond oak leaves with pearl acorns. These symbolize England's great forests, the source of her early wooden navy. And under these imperial arches is the velvet Cap of Maintenance, a "fitting" piece of headgear, quite literally!

SHE SETS HER CAP

The whole balance and safety of the Crown depend upon the fit of this velvet cap. It is adjusted by a hatter for each sovereign. Inside is a chamois lining to keep it from slipping, and velvet pads are anchored at four places around the head so that when the heavy Crown presses down it won't hurt!

Actually, royal crowns can be a pain in the head. St. Edward's Crown originally weighed over seven pounds. The lightest one to date is the new all-diamond-and-platinum crown, only nineteen ounces, made for the present Queen Mother in 1937. If Elizabeth II chooses the State Crown, with its 2,783 diamonds, she will wear it walking out of the Abbey and all during the Coronation procession through miles of London streets. And never must a crown wobble or pitch over one ear.

Balancing a book on your head would be no training for this, either—unless you used about five books. In fact, all the trappings of royalty tend to be weighty. Queen Victoria was tiny (just over five feet tall), but her mantle, robe, Crown and Scepter weighed over thirty pounds!

ADVENTURE IN JEWELS

The Crown Jewels have had some thrilling adventures, in and out of the Tower of London, where they live. It was Charles II who first put them on public display as they are today. Shortly after this innovation, an attempt was made to rob the Tower and only the quick wit of a few attendants prevented the loss of everything for which King Charles had just gotten the bill paid! The Earl of Pembroke, in his will, left fifty pounds for the footman "who cudgell'd the thief . . that knave of dyamonds!"

During the Second World War, the regalia were taken to Windsor Castle for safekeeping. And just in time! A "doodlebug" bomb hit a nearby building and smashed to fragments the great glass case in which the objects were exhibited. At Windsor, the most precious of the gems, including the Koh-i-noor diamond, were pried out of their settings with a pair of scissors, stuck in a jam jar and buried in

a potato field. The crowns, wrapped in newspaper and packed in old-fashioned leather hatboxes, were stored in a passage under the castle. The far end of the passage opens into Sherwood Forest—something that would have surprised Robin Hood!

When Elizabeth was a child Princess at Windsor, she and her sister were taken down by their governess to see where the Crowns were being kept—the battered boxes in the cold gray vault. Perhaps the young Queen will remember that adventure when the great State Crown is placed on her head in Westminster Abbey. Perhaps the picture of the old leather hatboxes in the underground gloom in a time of terror will hover before her eyes as she looks on the brilliant pomp of her Coronation Day. And perhaps the two scenes will blend together to symbolize for her the story of her people.

Two of the most interesting partners in the watchmaking world live in the modern middle western part of America physically but away back in time as far as their hobby is concerned. For Mr. Leopold Metzenberg spends all his free time collecting antique watches and has 570 in his collection thus far. While Richard Cole specializes in making them run the way they used to, centuries ago. This is quite a challenge because in many cases he doesn't even know what the missing parts look like until accomplishing a considerable amount of library research. Then he not only has to manufacture them from scratch, but also must, in many cases, create tools and dies for the purpose—which is generally more difficult. Some of the watches (which required 40 trips to Europe this far to bring together) are built almost completely of wood. Others have figures that move with the motion of the hands.

"Instead of oiling it, could you give it some water? The cuckoo hiccups."

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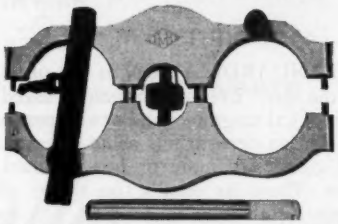

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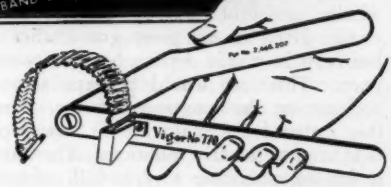

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When Is a Timekeeper a Collector's Item?

By WILLIS I. MILHAM

(Courtesy N. A. W. C. C. Bulletin)

STANDARDIZATION is the order of the day. Even the questions asked of horological magazines and newspapers with antiquarian departments about old watches and clocks are more or less standard in form. There are usually five things about which information is desired. The questions are: (1) Who was the maker? (2) When was it made? (3) What is known about the maker? (4) Is it a collector's item? (5) What is its value?

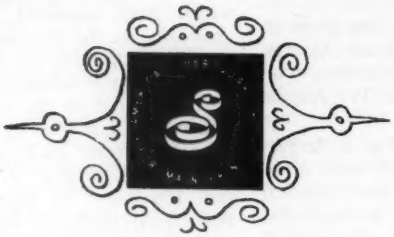
The material submitted to get these answers is often scant, irrelevant and even incorrect. Suppose, as an example, the questions have to do with an old American factory made watch. The name of the maker, if given on the dial, is usually stated. The designation on the movement and the factory number are also usually stated. The facts about the case are usually scant. The size is often not given and it is called a gold watch, which may mean gold plated, gold filled or solid gold. The value of the watch is desired and yet the condition of the movement is not stated. It may be in full running order; it may be broken; it may be badly rusted; it may have missing parts. Often wholly irrelevant facts are given such as it was given to my great grandfather or has been in a safe deposit box for twenty years. This last would perhaps account for rust on the movement if any. From this material the magazine or newspaper is to answer the five questions. The moral is for the questioner to give full complete information even if it is going to lessen the value of the watch.

As another example one might use an old (antique?) Connecticut shelf clock dating from the 1830s or 1840s. The name and place if given on the dial will be stated. There very likely is a clock paper and, if so, the information on it is given. The case is probably very insufficiently described and its condition is not stated. It may be in good condition and original throughout; it may be a wreck with a replaced painted panel or tablet. The movement may be in good running order; it may also be a wreck. From this material the five questions are to be answered. The moral again is for the questioner to give full complete information.

The first question: "Who was the maker?" is usually not hard to answer from the data submitted. If it is an American made timepiece there are six lists of makers that should be consulted. The latest and largest list is in the magnificent book *The Book of American Clocks* by Brooks Palmer. It contains some 6,000 names and was published by the Macmillan Company in 1950. A second book, *American Clocks and Clock Makers,* by Carl W. Drepperd, is also a mine of information. It was published by Doubleday & Company in 1947 and contains more than 4,000 names. There are two books by Wallace Nutting that contain lists of makers with some 2,000 names. They are *The Clock Book* and volume three of *Furniture Treasury.* In *The Clock Book* by Hudson Moore there is a list of some length of both American and foreign makers. In the book *Antique Watches and How to Establish Their Age* by Henry G. Abbott there is a long list of makers, both American and foreign, with the foreign entries predominating.

If it is a foreign maker that is being looked up, then there are two magnificent books to be consulted. One is *Watchmakers and Clockmakers of the World* by the famous horologist G. H. Baillie. There are some 35,000 names in his list. The other is *Old Clocks and Watches and Their Makers* by F. J. Britten. The last edition of this book is the sixth and the list contains some 17,000 names.

These eight books are the ones consulted when a question is asked about a given maker. There are a few much smaller foreign and American lists of makers, but the names in these lists are nearly always included in the larger lists. If a name is given in several lists there may be discrepancies in the spelling, in the dates



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and in the location. If this is the case then research is necessary. If this is not done the information given in the later, larger lists is apt to be the more accurate.

Probably only a very small number of even the members of the National Association of Watch and Clock Collectors, to say nothing of the general public, possess all of these books. It is thus necessary to use public libraries. These libraries in the larger cities usually have most of these books. The two largest, most complete and most important libraries when it has to do with horological books are The Public Library at Fifth Avenue and 42nd Street in New York City and The Library of Congress in Washington. The Library of the National Association of Watch and Clock Collectors is now in charge of George H. Eckhardt, the Chairman of the Library Committee. It is housed in the Franklin Institute in Philadelphia, Pa. It is growing rapidly and soon may compare favorably with other libraries as a place where horological research can be done.

The information given in these books usually consists in the maker's name, his place of work, the dates when he was active, something about his life and times and perhaps a list of his known watches and clocks and the muesums or collections in which they are located. His picture and that of some of the timepieces that he made may be added.

The second question: "When was it made?" is as easy to answer as the first. The information given in the various lists of makers usually includes the place of business and the dates when the maker was busy.

If the maker is not known then the age must be judged by a critical examination of the case and movement at the hands of an expert.

If it is an English made watch in its original case then the hall marks in the case will give the date of manufacture.

If it is an American factory made watch and the maker's number is on the movement, then the date can usually be determined. In the book *The Book of American Clocks* by Brooks Palmer the year when made corresponding to the maker's number is given for quite a few of the older and more important watch compa-

nies. Similar information is also given in the BULLETIN of the National Association of Watch and Clock Collectors, Vol. II, No. 9, Whole Number 19, August 1947, pages 173-177.

The third question: "What is known about the maker?" is a much more difficult one. This usually involves research which has been defined as an excursion into the unknown. In order to do this it is necessary first to reach the frontier of the known and that means to consult all books, booklets and magazines that might contain anything about the maker in question. The books containing lists of makers should be consulted first, since they usually contain some items of information about the life and times of the maker, particularly if he is well known or even famous. Then there are at least ten or twenty more books which should be consulted. It will be necessary to visit some large library to do this. In the New York Public Library there are some 700 to 800 books on horological subjects. In the Library of Congress there are somewhat less. More about these libraries can be found in the BULLETIN of the N. A. W. and C. C., Vol. III, No. 3, Whole Number 23, May, 1948, page 76. In the book *Time and Timekeepers* by Willis I. Milham there is a carefully classified bibliography of 518 entries. It comes down to about 1922. As an insert in the BULLETIN of the N. A. W. and C. C., Vol. III, No. 7, Whole Number 27, February, 1949, there is a "List of Books and Booklets on Horological Subjects Published 1920-1948" which was compiled by Joseph Sternfeld. It covers twenty pages. It is easy to consult any of these books provided the book is available and has a good index.

There are some twenty-five periodicals which have published or are publishing antiquarian horological articles. It is hard to locate a complete file of any magazine and it usually does not have an index. Not even the great New York Public Library has all of the magazines or complete files. Thus consulting magazines is a difficult matter. In the BULLETIN of the N. A. W. and C. C., Vol. III, No. 1, Whole Number 21, December, 1947, there is a list of the horological articles which have appeared in the magazine *Antiques*. In the BULLETIN, Vol. III, No. 9, Whole Number 29, July, 1949, there is a list of the horological articles which have appeared in the magazine *Hobbies*. During the last four or five years the attempt has been made in our BULLETIN under "Bibliography" or "Review of Current Literature" to digest all antiquarian horological literature which has appeared in the various magazines and newspapers.

If now all of the information about a given maker has been gathered from the various books, booklets and magazines, and digested, then the frontier of information has been reached. If still more is desired, then research must be done. This means usually consulting state, county and local histories and directories and also lists of patents. Some information is given about horological patents in BULLETIN, Vol. III, No. 2, Whole Number 22, March, 1948. All of the United States horological patents are in class 58. There are 140 subdivisions of this class but not all numbers are used. In Washington, D. C., the horological patents are housed in eight columns of twenty-two compartments each; which makes 176 compartments. There are on the average about forty copies of patents in each compartment. This means that there are between 6,000 and 10,000 horological patents. In New York City, at the Public Library, the copies of the patents are bound in volumes in order of date, but there is an index so that horological patents are easily found.

Question (4) "Is it a collector's item?" and question (5) "What is its value?" can be treated more or less together. Most magazines and newspapers that answer horological questions are wary of the fourth question and side-step the fifth question entirely. There are three reasons. The submitted data is usually very incomplete; values are not at all fixed, since it is said that the value of an antique is what one can get for it; in the third place neither the would-be seller or buyer are ever satisfied with the value set.

In order to determine whether a given timekeeper is a collector's item or not there are eight matters to which careful consideration must be given. These are:

(A) Age; an antique or not.
(B) Original cost.
(C) Condition; original throughout.
(D) Maker famous or well known.
(E) Rareness.
(F) Unusual construction; novelty; attachments; complications.
(G) Belonged to a famous person.
(H) Artistically pleasing.

(A) AGE is the least self-evident and most troublesome consideration of all. How old must a timekeeper be to be considered a collector's item? A glib answer would be that it must be an antique. And what is an antique? A glib answer would again be some artistic artifact made before 1830. This year 1830 is chosen because by enactment of the Seventy-First Congress all "artistic antiquities" (the word antique was never used) made before 1830 could be imported free of duty and on those imports made after 1830 duty must be paid. There is a very strong sentiment at present that 1830 is too early and that the date should be made 1850 or there should be a sliding scale, say, 100 years old. When it comes to clocks and watches all of these dates are too early and simply preposterous. It would eliminate much more than half of the Connecticut shelf clocks, now definitely and universally considered antiques; all filigree clocks, all gadget clocks, all quantity-made American watches and many other kinds of timekeepers as well.

As regards age, the following might be a tentative guide as to whether a timekeeper should be considered a collector's item or not. It is a list of eligibles.

AMERICAN MADE WATCHES

(1) All watches made before 1860.
(2) All hand-made unusual watches made before 1880.
(3) The first 10,000 made by any factory before 1870.
(4) The first 1,000 made by any factory before 1895.
(5) All key-wind and key-set made before 1875.

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(A) Small Connecticut shelf clocks.
(B) Wall clocks (drop form).
(C) Round, octagon or many sided wall clocks.
(D) Regulators (wall clocks).
(E) Bronze fancy cased shelf clocks.
(F) Calendar clocks—Ithaca, Fashion and others.
(G) Decorated iron front clocks.
(H) Winkies (moving eyes).
(I) Timby solar globe and other globe clocks.

(3) All clocks of the following six kinds made before 1900. They were patented, invented, designed or first made between 1875 and 1900.

(A) Gadget clocks including Bobbing doll; Swinging doll; Columbus; Jumper (turning pages); "Ignatz"; Rotary pendulum, etc.
(B) First round metal alarm clocks.
(C) Traveling tin and glass clocks in French style.
(D) Black iron or stone cased clocks in French style.
(E) Filigree or gee-gaw clocks.
(F) First electric clocks.

FOREIGN MADE WATCHES

All watches made before 1875, provided they are key-wind and key-set.

FOREIGN MADE CLOCKS

All clocks made before 1875.

For a complete enumeration and classification of all American made clocks from the beginning to 1900 see BULLETIN of the N. A. W. and C. C.:

Vol. I, No. 8, Whole Number 18, June, 1947.

Vol. II, No. 10, Whole Number 20, October, 1947.

Vol. III, No. 2, Whole Number 22, March, 1948.

The value of a timekeeper does not depend directly on age, but in general the older it is the greater is its value. The first consideration is whether it is a collector's item or not. If it is, then the value depends on a number of things to which later consideration will be given. If it is not, then for a clock it is, as for any second-hand object, its value as something for everyday use. For a watch it is also its value as an object of use, but there is here a second consideration. A watch is always worth the value of the gold or silver in the case.

(B) ORIGINAL COST. If it is a collector's item, then, the value is always much greater than the original cost; usually from two to twenty times as much. If it is not, then the value is correspondingly less than original cost. This, of course, always assumes "other things being equal."

Two examples may illustrate this. In 1892 the firm R. H. Ingersoll and Bros. began selling inexpensive watches. In 1893 at the World's Columbian Exposition at Chicago they sold a souvenir watch for $1.00. This is "the watch which made the dollar famous." Now if in good condition and running order this watch sells for from $15 to $30.

A Clarke, Gilbert and Co. Connecticut shelf clock made at Winsted, Conn., about 1845 or a little later in an ogee case with a one-day brass movement sold originally from $10 to $15. Now if in original condition and in good running order the value is from $20 to $35.

(C) CONDITION; ORIGINAL THROUGHOUT. This is almost a self-evident consideration. A Connecticut shelf clock which has a broken painted panel or tablet, which has lost its clock paper and has a dilapidated case with a movement in very bad condition is not a collector's item and has very little value. It hardly deserves preservation.

How much renovation and restoration can be done without causing a timekeeper to cease to be original throughout is an open question.

(D) MAKER FAMOUS OR WELL KNOWN. This again is an almost self-evident consideration. One at once calls to mind such names as:

George Graham; Thomas Tompion; John Harrison; Urban Jurgensen; Boviet of Fleurier; Abraham Louis Breguet; Luther Goddard; Simon Willard; Lemuel Curtis; David Rittenhouse; Eli Terry; Seth Thomas, Chauncey Jerome; Jacob Custer; and many others.

They brand a timekeeper at once as a collector's item and add much to its value.

(E) RARENESS. This also is a self-evident consideration. Other things being equal, rareness adds much to the value of

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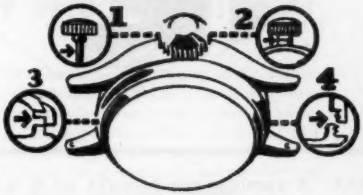

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a collector's item. In fact, if too rare the value becomes fictitious and impossible to state. It then depends entirely on the caprice of the buyer. Fortunately very few timekeepers are as rare as this.

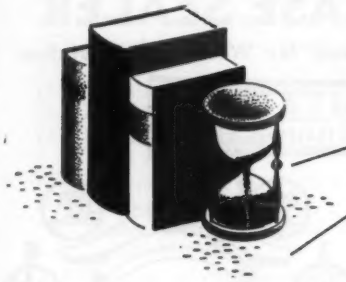
(F) UNUSUAL CONSTRUCTION; NOVELTY; ATTACHMENTS; COMPLICATIONS. Here again the consideration is self-evident. Unusual construction and the like add much to the value of a collector's item. How much it is usually impossible to say.

(G) BELONGED TO A FAMOUS PERSON. Everyone has seen references to George Washington's clock; to the watches which belonged to Robert Burns; to the watches belonging to Mary, Queen of Scots, Queen Victoria and Queen Elizabeth; to Oliver Cromwell's watches, etc. Belonging to a famous person makes a timekeeper equally famous and valuable. Having some connection with a great historic event also makes a timekeeper famous. Here again values are entirely fictitious. Abraham Lincoln's old silver watch—a Waltham—was recently sold at auction for $1,800. Without this association $18 would have been a large price.

(H) ARTISTICALLY PLEASING. It is a moot question if a timekeeper must be artistically pleasing to be considered a valuable collector's item. As an illustration take the lighthouse clock and the banjo clock made by Simon Willard. Everyone would admit that the lighthouse clock is much less artistically pleasing, but it is much more valuable due largely to rareness. The same consideration holds for clocks made by Eli Terry in a pillar and scroll top case. Those with the escapement in front of the dial are much less artistically pleasing but much more valuable.

Summary: In this article the attempt has been made to point out the way to gather the information in order to answer the questions which are so often asked in connection with any timekeeper. Of the five standard questions, the last one on the value of a timekeeper is the hardest by far to answer.

The only thing worse than working in a jewelry store where the boss knows everything —is to work in a jewelry store where the boss thinks he knows everything.



INFORMATION Please

HKC: A question was brought up at a recent meeting as to what the difference was between a duplex escapement and a cylinder escapement, but I did not get a clear understanding of just what the difference was. Will you kindly explain?

Answer: The cylinder escapement and duplex escapement are both known as frictional escapements, and by that, it means that in either case, the tip of the escape wheel tooth, when at rest, lies on the small roller in the duplex escapement, and for the cylinder escapement the tip of the tooth either rests on the outside of the cylinder or the inside, after giving impulse to the balance. In the duplex escapement, there is the long tooth which comes to rest on the small roller, but this small roller has a V-slot in it that allows the tip of the tooth to pass by. As it passes by, there is an upright tooth that engages the impulse lever attached to the staff, giving impulse in one direction only. It is sometimes known as a detent and single impulse escapement. In the case of the cylinder escapement, one tooth of the escape wheel comes to rest on the outside of the cylinder, and it gives impulse while passing through, dropping to the inside of the cylinder, and when passing out, it gives impulse to the cylinder in the opposite direction.

So the question might be answered by saying that in the case of the cylinder watch, the balance gets its impulse in both directions, the same as in the lever watch, but with a duplex escapement, the balance only gets its impulse in one direction.

WWN: I am rebuilding a clock striking mechanism on the hour and half-hour strike to a chime or a tubular gong. I am well on the way, but now I am at a loss about procuring tubes that will give the notes I desire, and tubes which will give a good volume of sound.

Answer: A. C. Deagan & Company, 1717 Berteau Avenue, Chicago, Illinois, manufacture tubular chimes, and can supply you with any information you need.

MCM: What is the definition of a chime clock?

Answer: Any clock that strikes the hour on more than one gong might be called a chime clock. For instance, a Westminster chime is constituted by a series of notes making musical harmony. Then the two-tone striking clock, striking on two different toned gongs, making a harmonious sound, would also be called a chime clock. But the clock which only strikes on one gong cannot be called a chime clock, as it strikes only one tone.

LAV: What is the weight of a twenty-dollar gold piece?

Answer: A twenty-dollar gold piece, or double eagle, weighs 516 grains. The ten-dollar gold piece, or eagle, weighs 258 grains. A five-dollar gold piece, or half-

INFORMATION PLEASE

Directed by
W. H. SAMELIUS

Chairman, Science of Horology and Technical Advisory Board

WHAT YOU SHOULD KNOW ABOUT WATCH CLEANING & RINSING SOLUTIONS

and why L & R has consistently been the best seller

Almost two decades ago the L & R Manufacturing Company recognized the need for a well-equipped laboratory dedicated specifically to the requirements of the watchmaker. In this laboratory, which has steadily grown in scope, specialist-chemists compound solutions that perform their task so well that the United States government, too, has recognized the superiority of L & R solutions. They conform to the stringent Service standards and specifications which have been set up for watch cleaning and rinsing solutions.

L & R EXTRA FINE WATCH CLEANING SOLUTION: L & R was the first company in its field to develop a waterless type watch cleaning solution. Extra Fine is the ultimate achievement in this category. It is the result, not only of constant research and experience, but also of the use of particular components, perfectly proportioned and produced under exacting conditions through every step of manufacture. This solution, with a flash point of over 85°F., is non-explosive. It is also non-toxic, is formulated to prevent varnish formation and give the highest polish ever achieved on watch parts. Absolutely clear and free of foreign matter, it works faster on the most contaminated parts and has the longest life of any watch cleaning solution on the market.

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L & R #1 FOAMING WATCH CLEANING SOLUTION is a water-base cleaner, the formulation of which L & R has controlled through an exclusive method of filtration. Years of experience and experimentation have enabled L & R chemists to select the best raw materials for this solution. As a result, the combination of ingredients and controlled production has made it possible for L & R to produce the finest water-base solution available.

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eagle, weighs 129 grains. This is the standard weight for new coins, but why worry about it? How many of us today have gold coins?

LD: When polishing pivots, how does one use diamontine to obtain the fine polish? Some men tell me they use fine diamond powder.

Answer: After the pivot has been ground to size, using a soft iron slip charged with finely powdered oilstone mixed with oil to the consistency of soft putty, you can proceed to polish the pivot. Mix diamontine and oil to a thick paste form and then with a bell metal slip you will obtain a high polish.

Use polishing powder very sparingly and run the lathe at high speed. Watch oil is commonly used for mixing diamontine, perhaps because it is handy on the bench, and clean. But watch oil does not dry up on the polishing slip, and for that reason, and to get quicker and better results, mix the diamontine with olive oil. The best polish is obtained at the time when the polishing powder and oil become practically dry, giving quicker results and a very high polish. Some men use a boxwood slip to obtain the high gloss, but if any lines remain on the pivot, the boxwood slip will not take the lines out. Your writer advises against using diamond powder for grinding or polishing pivots, as the diamond powder may become imbedded in the surfaces of the pivot, and then the pivot will act as a lap and will cut the jewels or the metal bearing.

RMJ: My employer claims that the escapement should be left dry, and I understand that to get satisfactory results, the escapement should be oiled. Which is correct?

Answer: A vast amount of tests and experimental work has been done in recent years in relation to oiling or not oiling the train pivots, balance pivots, pallet arbor pivots, by the research departments of the many watch factories. No doubt the research work continues, but so far, the conclusion is that the pallet stones of a lever watch should be oiled very carefully and only with oils of fine quality. Most internationally known authorities and leading watch manufacturers on both sides of the Atlantic do oil and recommend oiling all pivots or wherever friction occurs. A very fine watch of the highest grade and in perfect order, having a perfectly adjusted light escapement, might run satisfactorily with the pallets dry. I say "might" rather than "will" because it is unlikely that even a very fine watch will keep time or continue to keep time under the most favorable conditions. The average run of watches as we find them on the repairer's bench even in a good store, cannot be classified with the above mentioned grade.

If you examine the watch carefully and critically, it is not always as it should be. The escape teeth may be rough, the wheel thick, and the teeth insufficiently polished. The pallet stones, while they may appear polished, under a strong microscope, might show grinding and polishing lines. These lines on the pallet stones may run crosswise to the line of motion. The remark that very finely finished movements do not require oiling might have arisen from the fact that a chronometer is considered a very fine and accurate timepiece, but it is oiled throughout its train, except the escape teeth. Oil on the escape teeth will, in time, change in condition and the chronometer is so sensitive for timekeeping that any change in the oil on the escape teeth will reflect on the timekeeping qualities of the chronometer movement.

What little friction which occurs in the chronometer escapement is constant and does not require oil. In a watch escapement, the tooth drops onto the locking side of the pallet stone, and there is slide that draws the lever to the bank. Then as the tooth passes over the stone, giving impulse, this action should be oiled. To play safe, and to have satisfied customers, oil the escapement until research departments or watch factories advise us otherwise.

EG: I have been asked by our Dinner Club to give a talk on watches, and I would like to make a little story about our early watches, including such information as when the first mainspring was invented, when we first had porcelain dials for watches, and the year watch crystals came into use, and also, when the minute hand and second hand made their appearance, when the first watch

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factory was organized in the United States, and how many watch factories have existed in the United States.

Answer: The first mainspring was introduced in 1504 by Peter Henlein of Nuremburg. Our records show that enamel dials were invented in 1635 by Paul Vite of Blois, France. In 1620, watch glasses were introduced as a protection for dials and hands. The minute hand, concentric with the hour hand, was introduced in 1670 by English clockmakers. The second hand was introduced in 1676. The first American watch factory was at Shrewsbury, Massachusetts, established by Luther Goddard in 1809. In all, we have had some 55 watch factories in this country.

WEP: All watchmakers have their way of regulating a watch after it has been repaired. Some just wind the watch, hang it on the rack, and wind and regulate the watch each morning until it is a satisfactory timepiece. Others wind the watch, set and regulate it in the morning, hang it on a rack for delivery during the day, and then at night remove it from the rack and place it in a safe, giving a two-position test—pendant up and dial up. Other watchmakers have their timing machines so they can rate the watch in the various positions, regulate it, or make necessary adjustments. When the machine shows satisfactory rates, in keeping with the quality of the watch, they lay the watch away in an envelope, ready for delivery. They save a great deal of time for winding, setting and regulating a watch each day, but here is my question: What can we do about the automatic-winding watch to know that it will prove satisfactory after being repaired?

The automatic watch is becoming more popular and we are receiving more of them for repairs. Occasionally we strike a troublesome one that does not wind properly. To satisfy myself, I test the watch by personally wearing it, but today we have too many automatics on the rack for a person to carry. What I wish to know is: how are these watches tested at the factory, and is there any device on the market that can be used to test the automatic watch—say some machine that would wind the watch for a period of eight hours, and then stop so that we can determine how much surplus power is stored up? It seems that some such device would be helpful to the repairman.

Answer: Your writer realizes just what you mean and what troubles some of these automatic watches can cause. I understand the watch factories have a special machine that holds 30 or 40 watches at a time, and that the machine is caused to rotate a fixed number of times which would be sufficient to wind the mainspring to the slipping point. But as far as I know, there is no machine on the market whereby we can test the winding mechanism of the automatic watch. Perhaps some of our readers have some contrivance and would let us know about it. Or it might be that this suggestion might interest some manufacturer who may be able to produce an inexpensive machine for testing the automatic-wind. Let us hear from our readers.

Merry Christma

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JMcD: At the shop in which I work we have several watchmakers, and it seems they all differ in their opinion as to the proper amount of side and end shake to allow for balance pivots and train pivots on the average watch. We will appreciate any suggestions you may offer.

Answer: The answer to the question of end and side shakes for balance pivots and train pivots seems to be any amount our conscience or experience considers okay. One of the state examining boards allows four points for end shakes and four points for side shakes, but they do not tell us what actual dimensions or measurements these points mean. Your writer contacted the board about end shakes and side shakes and what the actual dimensions should be, and the answer I received was, "use your own judgment." Perhaps they have a point there, as some watches will perform quite well with what one watchmaker would consider excessive end shakes, while the other workman says as long as the watch keeps time, why worry about the exact amount of end shake? But from experience, we all know that a balance having close end shakes and side shakes shows a better rate in all positions than the one with extreme end and side shakes.

The following table shows tolerances allowed by the factories in general:

	End Shake	Side Shake
Balance Staff	.0006-.0005	.0002-.0004
Pallet Arbor	.0006-.0010	.0003-.0005
Train Pinions	.0006-. 002	.0003-.0005

FBT: I came into possession of an old wall clock that is electrically wound. It has a small motor in it, but does not show where any outlet or plugs can be attached. On the dial is printed, "Self-Winding Clock Company, New York." Can you tell me what kind of current it takes to run the clock?

Answer: You have one of the early self-winding clocks that was not connected to any outside source of energy, such as our modern electric clocks. You will find two 1½-volt, 6-inch dry cells will drive the motor to wind the clock. The clock operates on three volts' output.

WEJ: When, where and by whom was it decided that the day be divided into 24 divisions?

Answer: Quoting from Roy Rutherford Bailey's book: "Division of days: As far back as the reign of the Babylonian King Sargon (dating about 3800 B.C., according to Nabonidus) the Babylonians and Chaldeans had long had the heavens under expert observations. Their astronomers knew the inequality of the sun's daily motion, of the cycles of Venus and her sister planets, and many other sidereal phenomena now popularly supposed to have been discovered by Hipparchus and other comparatively modern observers. The subdivision of the day into 24 parts, or hours, has prevailed since the remotest ages. The division of hours into minutes, adopted by Ptolemy in the second century, is likewise traced back to the ancient Babylonia. The Latin term for the minutes was *pars minutae primae,* and for its further division by the sexigesmal or "sixtieth" system was *pars minutae secundae.* Hence, our word "second." The basis of the sexigesmal system is the fact that no smaller number can be divided by so many other numbers as can the number 60. Its projection by the Babylonians into a year of 360 days, however, led them into difficulties with their calendar, necessitating the doubling of one month every six years. The Brahmans reversed the Babylonian ratio, dividing the day into 60 hours of 24 minutes each.

JE: I have a peculiar watch. The escape wheel has two sets of teeth, one set of double teeth on the edge and another set of teeth which are upright on the rim of the wheel. The watch is apparently in good condition, but needs a hairspring. I am at a loss to tell how many vibrations the balance is to make per hour. I am sending you a sketch of the watch and the number of teeth in wheels and pinions.

Answer: You have acquired one of the early double duplex escapements. It is one where the balance gets an impulse every other vibration. To determine the number of vibrations the balance makes per hour, multiply the number of teeth in the center wheel (64) by the number of teeth in the third, fourth and escape wheel times 2. Divide by the number of leaves multiplied by themselves in the third, fourth and escape pinion as follows:

Center wheel (64); 3rd wheel (60); 4th (60): escape wheel (12x2) over —

Third pinion (8); 4th (8); escape pin-

ion (6) equals 14,400 or 240 vibrations per minute or 4 per second.

GAL: I would like to know the age and possible value of a movement if the information is sufficient to identify it. It has a cylinder escapement, 12½-13 ligne, 10-jewel, enamel dial, Roman numerals, gold inlay minute indication, named "Alpine" in excellent script. The case was made by the Providence Watch Case Company and the serial number is 674744, lever set. What date was the cylinder watch discontinued and were any made by American manufacturers?

Answer: From the description you give, it is very likely that the cylinder movement was imported into this country and cased in a Providence case. This was common practice some 50 years ago, and even today Swiss movements are imported and fitted to American cases. I can find no records of the "Alpine" watch, but it is fairly safe to say your watch is from 25 to 30 years old, as this size watch was popular at that time. The cylinder escapement has not been discontinued entirely, as we still find cheap cylinder watches being imported. At no time did any American watch manufacturer build cylinder watches. The only watch manufacturers who built a watch not using the lever escapement was the New England Watch Company which built the duplex escapement. It went out of existence about 1905.

The following comments are from Mr. JW concerning a letter from Mr. SAG in the October issue of A.H.&J.:

From what mental institution did you receive the query signed by SAG? From time to time, I run across work which I believe must have been undertaken by Mr. SAG and the like, and customers wonder why the repairs are so expensive. Geezers like him should go back to the anvil. Imagine—nary a comeback for 15 years.

And another comment about Mr. SAG from Mr. WPW:

This is in reply to SAG: Taking a watch to your shop, SAG, is like being treated by a "quack" doctor. After we're all fouled up, we must go to a skilled man in the profession and get straightened out. You have no comeback because your customers are all rushing their timepieces to a reputable watch repairman, one who removes the train wheels, pegs the holes and uses genuine material. I must admit, however, that ten-cent work deserves ten-cent oil, but not at the expense of your reputation and at the expense of the public who is paying you to do a good job.

I ask you, Mr. SAG, would you go to a doctor who bought his medicine for your troubles in a ten-cent store? I know you wouldn't. Science has treated the horological profession very well. Use what they have given us—every good craftsman does.

To conclude, Mr. SAG, here are a few good tips for you, however I doubt that after 15 years you will use them: First, read all the books on horology you can make available, preferably such books as those written by Donald DeCarle, Levin, Pellaton, Hamilton, and the American Horologist and Jeweler magazine; second, read Information Please; third, read Clockwise and Otherwise; fourth, take down your shingle until you can do the kind of work Mr. Coleman and Mr. Samelius write about each month; fifth, join a guild, state society, horological club, or talk to other watchmakers in your town; sixth, read the "Fourteen Points of Horological Service" in Donald DeCarle's book, "Practical Watch Repairing." The first and thirteenth points read as follows:

"(1) Always maintain the highest standard. Your reputation depends upon each individual job; you will probably try to explain away a

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ESTABLISHED 1912

FRANKLIN, PENNA.

To all readers and friends, past and present students of Elgin Watchmakers College, we are wishing a merry holiday season and that the future will have happiness and prosperity in store for all.—Mr. and Mrs. W. H. Samelius.

temporary lapse, but the chances are that you may not have the opportunity to do so.

"(13) Learn all you can; you have never finished learning. Read all there is to be read on watchmaking, and there is quite a lot of it. Above all, put into practice all the good stuff you read. You will readily recognize what is good—experience teaches that."

And here is another comment from Mr. ABC:

Your writer, SAG, who claims to have been a watchmaker for 15 years, and who has nerve enough to state that it is not necessary to completely disassemble a watch to clean it, is, in my estimation, no watchmaker. He is what I would call a botchmaker.

There is no solvent or solution known that will completely dissolve and remove old dried-up oils from jewels and pivots, particularly if the watch has been lying around for a few years. Also, if this so-called watchmaker does not remove the mainspring from the barrel, how is he to know if the mainspring is set, or if surfaces are rough from being run dry, or if the mainspring has any kinks in it. All of the above points are equally important if a mainspring is to drive a watch train with the same even power which is absolutely a necessity to make a timepiece keep the proper time.

Getting back to the train: if this person does not remove the train wheels, he cannot be even reasonably sure that there is not still gummed-up oil, dirt and lint between the pivots and jewels. Pivots can be worn rough by running in dirt or without proper lubrication. From the way this so-called watchmaker talks, he apparently doesn't remove the cap jewels either. Well, sir, all I can say is that I would surely hate to be one of this man's unsuspecting customers. As for the use of the dime store oil, tell this poor fellow to take a nice new nail and dip it in this oil and then let it set for about a week. Then let him take that nail and examine it under a microscope. If he'll try this little experiment, then I think he'll start using the best grade of watch oil that he can buy. This is, unless he just doesn't give a hoot.

A postcard from Mr. W. Stambaugh offers the following suggestion:

In answer to GAL's mainspring breakage trouble, tell him to wash his hands thoroughly in cool water and soap before touching the mainspring. I used to have ten per cent breakage, and now I have less than one per cent since washing my hands just previous to handling springs.

Other suggestions are also offered by Mr. Arthur Anklam:

I noticed in the October edition of A. H. & J your question about what to do when a watch is immersed in salt water, and my answer is as follows: Salt and sodium chloride hydrolizes in water and forms a mild solution of hydrochloric acid, so add magnesium hydroxide ($2\ H\ Cl + Mg\ OH_2 = MgCl_2 + 2H_2O$) and form magnesium chloride, a neutral salt and water; then w a s h the parts in distilled water, hot-air dry and put the watch through the regular cleaning procedure. My shop is in a suburb of Miami noted for its sailing club, and I get my share of watches—so far, there have been no comebacks where the rust had not started to form.

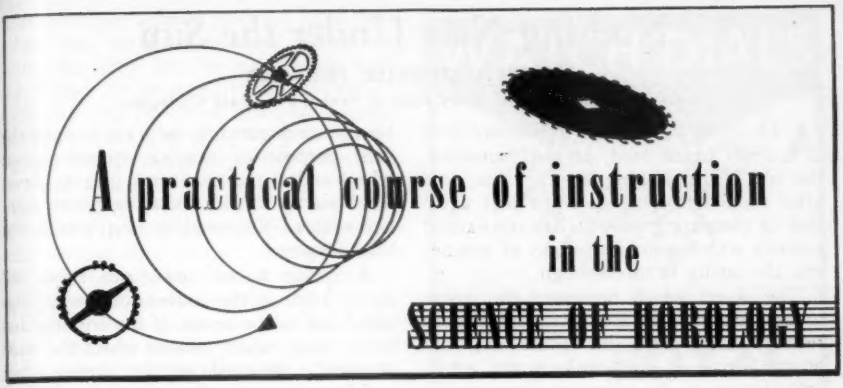
One more tip to pass along on sealed motors for Telechron and G. E.: Drill a hole at the top small enough so that you can tap out threads with an optical tap. Use a hypo needle to add carbon tet; run the clock for 15 minutes, drain out and add Moebius mainspring grease; insert an optical screw shortened to 1/8 inch, and forget them. This works fine—also—no comebacks for over six years.

A watchmaker who spends his time bragging about how he never went to school usually doesn't have to tell anybody.

* * *

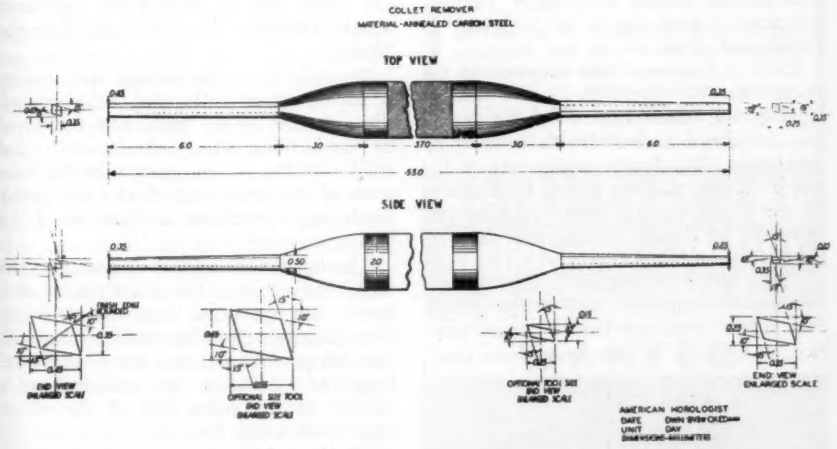
A wife is a person who has a mother who is sure she knows more about the jewelry business than you do!

"May I see that tray, please?"



By Orville R. Hagans and D. L. Thompson

WATCH REPAIRING—LESSON 26



(Continued Next Month)

Nothing New Under the Sun

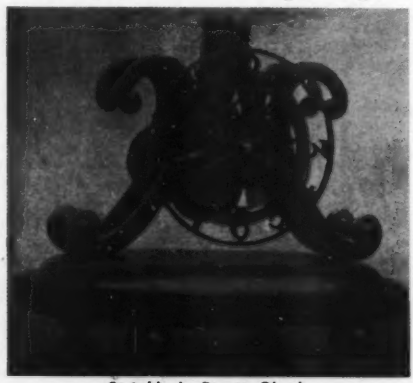
By EARL T. STRICKLER, FBHI, FRSA
Secretary, The National Association of Watch and Clock Collectors

ALL of us at one time or another have either heard used, or used ourselves, the old cliche making up the title, and after some retrospection, most will agree that in co.nparing present day mechanical marvels with horological works of another era, the saying is true enough.

The object which prompted the writer to use such a title is a clock which has recently come into his possession—the unique drive of the clock is the actual embodiment of the planetary transmission found in the motor car of today, and in its simplicity and the very fact of its being, more or less "steals the thunder" from the various manufacturers of the "hydra-" and "gyro-" and "ultra-" matics. Once again, what the press agents claim as a phenomenal nuance in modern mechanical science, turns out to be "old hat" in horological circles.

Little is known of the inventor of the clock, Mr. W. Strutt, Esq., save that in signing the nameplate with the suffix Esq. he placed himself in the category of gentleman. The Strutt family were of the Lords Belper, and the actual construction of the clock was probably done by one Wigston, of Derby, the ancestral shire of the Strutts.

Capt. W. A. Grant, in a now-defunct horological magazine, says: "The design is a radical departure from ordinary practice, an epicyclic or "sun-and-planets gear" being incorporated in the train to serve the dual purpose of gearing up the escape wheel and at the same time gearing down the hour wheel in a most ingenuous manner without the usual motion wheels for that purpose."



Strickler's Strutt Clock

A spring barrel and fusee drive the center arbor in the conventional way; rigidly fixed to the center of the annular dial is the "sun" wheel around which the train revolves. Mounted on the center arbor and free to revolve thereon is a large ring-wheel, having both internal and external teeth. Securely pinned to the center arbor, and revolving with it, is an arm having at one end a wheel and pinion free to revolve concentrically on a pin (just under Chapter 11 on the photo), and at the other end a balance—or counter—weight (between Chapters 5 and 6 on the photo).

The pinion on the driving arm, having 8 leaves, gears with, *and rolls around*, the sunwheel of 66 teeth, and the wheel on the driving arm, with 68 teeth, and solid with the pinion, gears with the *inner* teeth of the large ring-wheel (144 teeth) producing a resultant acceleration of 4.9 to 1.

The outer teeth of the ring-wheel (168 teeth) drive the escape wheel pinion of 6 leaves, and the escape wheel has 36 teeth. The pendulum therefore makes 164.64 vibrations per minute, and has a theoretical length of 5.2 inches. The minute hand is carried on the outer end of the center arbor with a slip fit.

The hour hand is geared down as follows: behind the sunwheel of 66 teeth, and concentric with it, is the hour wheel, of the same diameter, but having 72 teeth. This wheel, which is free to revolve, is mounted on a hollow arbor or cannon which forms a bearing for the center arbor, and extending through the sunwheel and dial, carries the hour hand on its outer end with a slip fit, so that both hands may be moved for setting the clock, but *entirely independent of each other*.

The pinion on the driving arm engages

with and rolls around both the *fixed* sunwheel and the *movable* hour wheel, but since the latter has six more teeth than the former on an equal circumference, its teeth are slightly closer together, approx. 0.0008 inches. The teeth on both wheels being cut with the same cutter, the spaces between are identical, the difference in pitch being in the thickness of the teeth. It follows, then, that as the driving pinion rolls around both wheels, each successive leaf of the pinion first encounters the next tooth of the hour wheel which tends to lightly obstruct its progress, but being free is pushed out of the way until the leaf meshes correctly with both wheels. It is evident that in every revolution of the pinion around the sunwheel it engages 66 teeth of both wheels, and imparts to the hour wheel a positive forward movement corresponding to its 6 additional teeth, or 1/12 of its circumference, and the hour hand on the dial will necessarily mark one hour's travel on the dial.

Ready comparison with the automotive transmission of today will show great similarity—the interjection of additional wheels and pinions in the train would provide for varying speeds (in the absence of an escapement)—so long as all were predicated on, and constructed about, the center arbor. Truly nothing is new under the sun, for the writer admits that this idea could not have been originated with Mr. Strutt, for there is conclusive evidence that the Egyptians of the pre-Christian era used it in pumping water from the Nile, and that the Chinese of Columbian days incorporated it in irrigation machinery. From Egypt to China to England to Detroit—as is always the case, horology and horologists play an important part in the development of mechanical innovations. The writer knows of one other similar clock besides his own, and readers of the *A. H. & J.* are invited to correspond with him if they know of one of the type.

It's interesting to note that the famous Paul Revere who made the even more famous Boston ride in regard to the British, was a goldsmith and engraver in addition to being a silverware manufacturer. What's more the finest wedding rings of Revolutionary times were made by this man. As a matter of fact he paid the first quarter's rent for his mother after his father passed away by selling 10.

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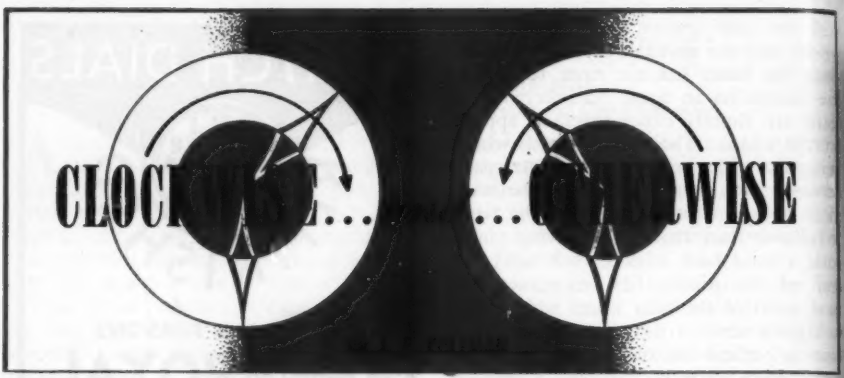

OTHERWISE

A good many months back it became quite evident that many clockmakers were experiencing a bit of trouble fitting new 400-day suspension springs—from time to time we've answered questions and advocated vibrating springs rather than trying to determine the correct strength by micrometer.

Some investigation and experiments were started with a view to arriving at some good and convenient method—this might be termed "project continuous" as there seems to be no end or limit.

The accuracy of the common commercial synchronous motor is quite within the scope of the 400-day regulator, and, can serve this purpose well; we selected a new MC 3/275 Telechron (1-R.P.M.) motor, and mounted thereon a 16-leaf pinion from which every other leaf had been cut; then by arranging a light contact above it in a 3-volt circuit powered by flashlight cells, and a flashlight bulb a flash every eighth minute was had. The bulb was imbedded in sealing wax and had about a 3-foot lead. Thus it was convenient to set the flashing bulb upon the clock base at the point where the swinging pendulum stops to reverse. By shifting the light to that ball stopping nearest to the flash, it was much easier to "beat" or vibrate in a new spring.

Like most of these "you-build-it" projects, by the time you've completed it, improvements are self-evident. The first noted was that a larger contact wheel than the pinion would give better and more accurate flashes, so we cut a round disc, two inches in diameter, accurately divided it into eighths and sawed small notches at these eight points. A different contact was rigged wherein the movable finger rides the disc, as in the early count wheel French, clocks—improvement No. 1.

Next, a method of advancing or retarding the flash was most desirable in order to synchronize the flash with the stop of the pendulum. The contact was pivoted on a lever concentric with the motor driving post, so by moving the lever forward the flashes come earlier—backward they come later—improvement No. 2.

Up to this point, the only thing looked for was merely determining whether or not the suspension spring on trial was too strong or too weak; now with a movable lever it becme apparent that if properly constructed, such a unit might not only indicate which side of the correct eight beats the test spring fell on, but something in the nature of a measure as to "how much" upon that side. Since we get a flash every eighth of the disc, the scope of moving the advance-retard lever is limited to one-eighth of the circle or 45 degrees. This affords a pretty small scale even upon a fair sized circle, so the idea of mounting it on the sector of a wheel and turning that sector by a pinion

Mr. Coleman invites your questions. If your question requires a direct answer, please enclose a self-addressed, stamped envelope. It is impossible through correspondence to give valuations of antique timepieces, questions of this nature cannot be answered.

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presented itself. An old wheel three inches in diameter with 80 teeth was located, and immediately substituted for the former advance-retard lever. A ten-leaf pinion with brass slug solder between two leaves at one point to prevent it from making the complete revolution was added, and on this pinion was placed a small radio knob with a hand-like pointer. This pointer was three inches long to rotate over a six-inch circle, or calibrated track, and with this arrangement we had the use of about nine-tenths of the complete circle—improvement No. 3.

Since it requires some manipulation of the advance-retard knob to synchronize the flash with the pendulum stoppage as a beginning place, we were never able to start on zero; to overcome this, a movable scale (round plastic disc—six inches in diameter) was placed under the knob, then the light was made to flash with the exact stop, and the scale revolved until the zero mark rested right under the pointer—improvement No. 4.

Further experimenting proved that the scale should be calibrated in both directions from the zero mark so that regardless of whether the spring under test was strong or weak it could be read "plus" or "minus."

The "machine" as it stands today plagued by all the alterations, improvements, etc., isn't worthy of a photo—besides, a photo might be misleading. But it definitely proves that such can be built fairly cheap and that it is *practical*.

The final operation boils down to this: a 400-day clock comes in to the shop, you haven't the slightest idea of what strength suspension spring is required, and even if you had, you have no way of knowing whether or not the weight of the pendulum has been tampered with, or if a different pendulum was substituted. The logical thing to do is to vibrate a spring to that pendulum ball, and fortunately you do know that the manufacturer designed the clock to beat eight-to-the-minute.

Assuming that you have the Horolovar assortment, take a spring from the middle of the package—do not cut it, but place on the two end chocks (leave off the fork, as it isn't necessary); hang the pendulum on the clock and give the ball a whirl; allow a few seconds for it to settle down and place the flashlight bulb as near it as practical; revolve the advance-retard knob until you make the flashes coincide with the stops; allow the pendulum to swing for two minutes (timed by a sweep seconds clock, or a two-to-one gear mounted upon your sync motor for that purpose — another improvement). During this two-minute wait, you turn the movable scale until its zero point rests right under the pointer. At the end of the two-minute test period the advance-retard knob is again operated to make the flashes coincide with the pendulum stops. A second time this reading from the pointer shows upon the scale how much fast or slow the spring under test is beating (vibrating).

With a bit of experience from the actual fitting of springs by this unit and method you will come to read the scale fairly accurately, or you may go through the entire ten sizes contained in the assortment and actually calibrate your scale to where it will indicate just about the spring needed.

We've discussed this with a few clockmakers—actually got one to try it. All indications are that, if anything at all, it is practical. We've also discussed it with Mr. 400-Day himself (Charlie Terwilliger). As mentioned before, our present "concoction" is not worthy of shipment to New York, and Mr. Terwilliger hasn't had time to construct one for trial purposes. After all, the $64-question with him is whether or not there would be any demand for such a unit. And if there is such a demand, would it be great enough to warrant production.

The work bench is the ultimate "proving ground" and we have many clockmakers who like to "build"; therefore, the general principle, sans any definite measurements or instructions in detail, have been outlined above as a sort of "you-build-it." Possibly some of our readers have already been thinking along these lines—maybe they have improvements that far exceed these. At any rate, here is ours—indicating willingness to cooperate for the "man-on-the-bench."

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As this Otherwise goes to press, we come to a pause in one search—we are sending Mr. Charles R. Brewer, Alabama City, Alabama, a copy of the following letter

H. Veracruz, Ver.
Oct. 14, 1952

Sr. Othon Roffiel,
Dario "El Excelsion"
Mexico, D. F.
Muy Senor Mio:

Having noted your article in "El Dictamen" concerning Sr. Francisco Vazquez, watchmaker, whose biography is of interest to Sr. Robert Allen of the Associated Press, I am happy to give you the following information:

Sr. Vazquez was born in this port, the son of State Governor General Ciriaco Vazquez (hero). When grown up, the boy was sent by his father to England to study watchmaking and succeeded in reaching great heights in the profession. Later he returned to Vera Cruz and opened a shop in the Portal (square) called "El Aguilo de Oro" (the golden eagle), where the Hotel Colonial now is located. Later he moved to the capitol (Mexico City), opening a similar business in Calle de Plateros (today Madero) opposite the church of the Profesa.

Later he returned to England and married a young girl named Ellen, whose last name I do not recall. Of this marriage there were three children, Isabel, Alfredo, and Francisco. Francisco was a lawyer, Alfredo, a watchmaker, and Isabel married.

This entire family now is dead, and there remains only the undersigned, Alberto Vazquez Alfonso, 80 years of age (father of the famous football player Chicho Vazquez of Sporting Club); Perfecto, director of the local beach club Villa del Mar; Alberto, a sales representative in Mexico City, and finally, Hortensia and Cristina, who live in this port).

I trust the above information will be of use to you, and remain very truly yours,

(s) Alberto Vazquez Alfonso.

(Translated: RAF 23-10-52).

And now I am shifting the Francisco Vazquez file to the inactive side. It isn't closed. You note I said that we come to a pause. Nearly ten years ago we saw a most unusual astronomical clock in the Brewer collection. He had no data at all on it, and we set about seeing what could be learned. I dare say this piece has come in for as much discussion as most any other piece in America, as little known as it was. I recall that my last talk with the late Emanuel Siebel at Charlotte was about this peculiar escapement. He carried a set of the photos back to Denver, and discussed it in detail with Dean Louis Dubois, who said it was definitely English. C. & O. ran the photos and description of it in the November, 1947, column and it brought many replies, one from Mr. Edward D o n e y, watchmaker, 780 Kinau Street, Honolulu, Hawaii — but there was nothing definite on its maker. The movement was shipped up to Mr. Robert Franks, National Association of Watch & Clock Collectors, Philadelphia, where Dr. Arthur Rawlings saw it and carried it to his home for further study.

We contacted Mr. W. H. Samelius, Mr. John J. Bowman, and others—no one had seen an escapement quite like it. Ever on the alert for something, when Mr. Robert Allen wrote the column over a year ago, we promptly forwarded a set of the photos and description. He did quite a bit of checking in Mexico City, even to contacting some of the astronomers in the hope that a clue would turn up. Not long ago he was browsing through some old watch movements at one of the Mexico City dealers when he ran across a watch marked: "Francisco Vazquez Mexico & Veracruz," and having located nothing in the capital city, and with this watch as a lead, he transferred his search to

Veracruz. His friend, Sr. Othon Roffiel, wrote in the Veracruz paper, El Dictamen an article about the search for the Francisco Vazquez history. This brought the letter from Mr. Alberto Vazquez Alfonso. In his translation, Mr. Allen points out that the word "hero" following the governor's name indicated that the Governor fought against the American invasion of Veracruz, headed by General Winfield Scott in 1847. It would seem that this is the grandson of the maker of this clock. Thanks to Mr. Allen, Mr. Brewer now has the Vazquez watch to go with his clock, as well as the address of the grandson. Isn't this good cooperation? My sincere thanks to all concerned.

* * *

Mail and visitors good this month.

Mr. Malcolm Gardner has just issued a new catalog, No. VII. It is of especial interest because it is principally devoted to recent purchases from the libraries of the late G. H. Baillie and M. Paul Ditisheim. To those horologists who enjoy "association copies," to own one with the bookplate of either of these great horologists would be a genuine pleasure.

* * *

Nice letter from Mr. Donald de Carle. Among other things, he tells me that he is now working upon a new volume on the repair of complicated watches.

* * *

Mr. A. Schwan, clock collector of St. Albany, New York, visited with us one morning, and a couple of days later Mr. R. Ticknor, Oakland, California, spent part of an afternoon. These contacts—direct—from across the country are most pleasant; for one thing they afford yours truly an opportunity to ask some of the questions. There is a definite spirit of fellowship among all those interested in timepieces, horological history, etc. Underlying it all, it is easy to detect that fine spirit of cooperation.

* * *

Friend Henry Fried made the Readers Digest for October with an article titled, "What You Should Know About Your Watch." A splendid article, and quite a contrast to the last Digest article we commented upon—all of our readers will remember "The Watchmaker Will Get You If You Don't Watch Out."

* * *

Mr. Raymond S. Behrle, clockmaker, 4142 Deyo Avenue, Congress Park, Illinois, sends down a pair of weights for the Chauncey Jerome, one-day, weight clock, which this column is readying to send to Malta, with the announcement that he is now making them for the trade. Ogee weights $4.00 per pair, f.o.b. He is also casting weights for banjo clocks, ranging from $2.25 for the two-pound ones up to $4.25 for the five-pound size—there are several numbers in between. A discount is given to clockmakers on lots of six. He is also casting a lap for the use of those who require a cast iron lap for polishing, etc. It comes rough, save for the shank which has been turned to fit the No. 50 chuck; it is slightly more than a quarter-inch thick, by two and one-quarter inches in diameter, price, $1.25, postage prepaid. Shortly, he plans to publish a list of clock weights—sizes, prices and drawings showing the shapes, etc. If you have need of weights for replacement, drop him a card and get on his mailing list. Regarding the clock for Malta, he writes:

"In these days, any little thing that we can do to promote friendship with other nations, either by service, material, etc., should pay dividends in the years that lie ahead of us. Happy to play a small part in this particular venture."

* * *

Splendid letter from Mr. Olaf Platou of Oslo, Norway. Regarding the great astronomical clock being installed in the Oslo Town Hall, he says in part:

"Later I must compile an exact description with illustrations of the astronomical clock, the great tower clock, 28 feet in diameter, the separate striking part and the carillon. But it will take some time to arrange and write it. The clocks are weight-driven, the carillon, electrical. The astrolabe gets an impulse every minute from a master clock. The great clock has a seconds pendulum and can be synchronized with the master clock by means of a patented invention of mine, but it can go independently. In due time, I can report to you in the matter."

* * *

Last month we mentioned that it would be interesting to have something on the clock repair angle in Indonesia. Mr. Kroner writes:

"I am sorry to tell you that I am unable to write much about the clock repair trade in this country, because there is no such trade existing. The only clocks I've seen here are some European type of grandfather clocks, dating no farther back than 30 or 40 years. There are no clock factories located in Indonesia as such, and I still have not found, up to now, any clock repair shop in the big city of Djakarta, with a population of almost three million people."

* * *

Mr. T. R. Robinson, 5 Upper Cran Brook Road, Bristol 6, England, whom many of us know from his writings in the British Horological Journal, writes a most interesting letter. He is interested in every angle of horology, with a leaning toward tower clocks. He tells me that he has examined and climbed over more than 600, photographing many of them. Speaking of his own timepieces, he mentions a 30-hour, weight, Chauncey Jerome, a Seth Thomas and an Ansonia, a fine Elgin watch, a 620 Waltham and a 992 Hamilton. He promised something that may prove very interesting:

"I'll try to give you a picture of British practice in future letters, and tell you the sort of repair shops we have and the tools we use. I guess they will prove similar to your own, and I wonder what sort of watches and clocks form the main work in your repair shops."

* * *

The column receives quite a few letters and comment upon being unable to obtain concrete information from factories relative to obsolete models, repair parts, etc. Many of these are quite difficult to answer, and most require a bit of diplomacy—from any angle the over-all question is both broad and complicated. It may be natural for a clockmaker to "hit-the-ceiling" just because some factory fails to reply to his inquiry, or, if they do, simply use a postcard informing him that it is "obsolete." On the other hand, has he any right to expect that factory whose main interest was and is manufacturing (not repairing) to have at their

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JOACHIM GOLDENSTEIN
DIAMOND CLUB - ANTWERP - BELGIUM

finger tips information on models and types manufactured half a century ago?

We asked the question—we don't propose to answer it. Nevertheless, it is a situation that is quite real and we wish it might be eliminated. Cooperation is our theme and C. & O. here repeats our desire to serve in just such situations. If and when you have occasion to write factories relative to failure to reply, etc., we suggest that you might mention to them that if data was supplied to the C. & O. files, a reply would be forthcoming. As an example, less than three days after receiving Mr. Raymond S. Behrle's Ogee, weight announcement, we got a "honey" of a letter from a clockmaker boiling mad because the manufacturer of one of these old one-day, weight, Ogee's could not or did not tell him where he might obtain weight replacements. We forwarded the Behrle address and hope that he is now happy. Perhaps we ought to start a slogan—"Ask C. & O."

* * *

This being the December issue, Christmas will have passed before Clockwise & Otherwise comes your way again. "Jan" and I wish each and every reader a very Merry Christmas, a Happy and Prosperous 1953.

We are grateful for your encouragement, cards and letters. We appreciate your letting us come these twelve times in '52, and we hope to make twelve visits in the New Year of 1953.

J. E. C.

CLOCKWISE

Dear Mr. Coleman:

I am sending a card with data taken from a 16-size watch, with the hope that you may be able to inform me what make it is, as I need a balance staff for it.

I had another of the same make, about an 8/0-size, for which I used a staff for an AS 1002 by cutting the upper pivot to a smaller diameter.

I have inquired at four different supply houses in Philadelphia for the staffs for these two, but no one can seem to identify them. The 16-size was used in the first World War, I have been told. The other came from Germany many years ago. The factory trademark is "IWC" the name on the dial, "Ulysse Nardin," and engraved on the back is "Property of Corps of Engineers, U.S.A."

ERNEST R. BROWN
278 Blanchard Road
Drexel Hill, Pennsylvania

Dear Mr. Brown:

Your information on the large watch is probably correct. Nardin supplied many watches to the United States government during World War I, and since you say the small watch is of the same make, a letter to Ulysse Nardin Watch & Chronometer Corporation of America, 11 East 48th Street, New York 17, New York, should bring you the information as to whether or not they are in position to still supply material.

If they cannot supply you with the balance staff, Burton M. Reid & Sons, Inc., First and Washington Streets, Springfield, Illinois, maintain a special staff department. You knock out the old staff and send it to them. They will duplicate it exactly and return by air mail.

J. E. C.

Dear Mr. Coleman:

I have two clocks that stop once in a while. The hands seem rigid and then all of a sudden they let go, and the clock might run for weeks, or only a few days. One of the clocks is a grandfather Herschede and the other is an old-time Seth Thomas weight clock. The grandfather clock ran for weeks in my store and did not act up until delivered, but I ran it with the dial off, and I wonder if it could be that the trouble arises only when the dial is on, and what I should look for.

R. J. STEPHENS
119½ Main Street
Huntington Beach, California

Dear Mr. Stephens:

Both your questions are most difficult—in fact, about the best I can do is a bit of guessing. After you have gone over a movement, I know that you caught any features evident and corrected them. On top of that, you indicate that the hands on both clocks pass through several 12-hour periods before hanging.

Let's "guess" at the grandfather clock first: Most of these Herschede clocks have a moon phase that is operated by a pin in the hour wheel. Have you checked

that feature to make sure that the moon disc works freely, and that the pin actuating it matches in between the teeth properly? Sometimes the clockmaker will devote much attention to the time train pivots, etc., and completely overlook the dividing wheel (sometimes incorrectly called the intermediate wheel). It is that wheel and pinion driven by the minute pinion and driving the hour wheel, i.e., dividing the hours and minutes. In many of these grandfather clocks, the dividing wheel operated under a bridge or cock with a pivot hole in the plate and the top pivot hole in the cock. These holes can become worn, and the cock can be bent or twisted to one side, permitting a "hand bind" under certain conditions—check for this. Failure to strike, especially on a rack strike (Herschede's are rack) can cause the hands to bind when the snail tried to raise a rack which was not raised by the striking operation. Always check the strike train.

Your Seth Thomas weight piece has much less to cause the hands to bind though it may be just as hard to locate. In these clocks, too, it is well to look to the dividing wheel. They have a rather mean arrangement whereby the hour pipe passed through the bearing in the front plate. Of course the minute arbor passes through the hour pipe, making a sort of bearing within a bearing. Now when the hole in the front plate wears, and a little extra load is thrown on the minute arbor, like lifting to strike, the hour wheel can be pushed aside into the worn spot and cause a hand bind. Check this front bearing and lso both dividing wheel pivots.

I suggest that you might wire up the strike trip so that lifting it is eliminated; remove the verge to permit the train to run down freely, and then substitute for the regular weight, a weight just barely heavy enough to keep the train in motion. Observe closely through several rundowns. Obviously, this test is carried out with both hands on—often this method will show up a bind.

J. E. C.

Dear Mr. Coleman:

I am sending you a picture of a movement from an old clock. Can you give me any information about the age of this movement? I would like to know the

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place it was made and any information that you may have as to its origin. I see that the wooden parts look like wood from the Black Forest of Germany.

EDGAR JAMISON

1370 Park Row
La Jolla, California

Dear Mr. Jamison:

Glad to have another of your good letters, but in this case, I fear that we will be of very little help. A fellow townsman of yours, Dr. B. W. Wright, was in the shop a couple of days ago, so you see we do keep in touch with La Jolla.

The clock you ask about is definitely German, and is generally called a Schwarzwald. This district was producing clocks prior to 1740, and their original pieces were all wood with only one hand. As the industry developed, the minute hand was added and they began to use brass for the wheels, retaining wood plates and arbors, as in your piece. As a rough guess, I'd say that possibly your clock was made in the very early 1800s.

You might check your A. H. & J. file for the January, 1949, issue. It carried an article on page 65 titled, "The Development of the Black Forest Clock." It will give you a general idea of the making of clocks there. Can you read German? Or do you have a friend who can translate for you? I have in the files a copy of "Historiche Uhrensammlung Furtwangen" by A. Kistner (1925) which I would be glad to lend to you. It will not date your particular clock—in fact because of the absence of a maker's name or some particular feature to date it, it would be impossible to pinpoint it, but a general idea of the development of the Schwarzwald clock may be gained from its study.

J. E. C.

Dear Mr. Coleman:

Do you have any information regarding the country starting the manufacture of clocks with wood works? In this district there are quite a number of grandfather clocks with wood works. (I restored many of them to working condition.) The vintage would be 1825-1835 and the name is Twiss Bros. They were from Connecticut and moved to Montreal where the cases were made and works imported, I am sure, from Connecticut, as some details differ. So the works were not all from the same factory.

The odd clock, shelf or tall, is from England, but most of the dozen or so shelf clocks with wood works are American, the vertical type. I take my hat off to the men who made them. Lots of fancy touches were put on that would be hidden from appreciation, except by repairmen.

By the way, was it bone or real ivory that was used for bearings in the tall clocks? In shelf clocks no bushings were used.

I take it that wood was used for its cheapness and availability. Rolled brass came into use later and spelled the doom of wood.

Do you get the Bulletin of the National Association of Watch and Clock Collectors? The October, 1952 issue, had something on wood works.

R. A. ARMOUR

Alexandria, Ontario
Canada

Dear Mr. Armour:

Glad to hear again from Canada. The origin of the wood clock is somewhat obscure. It is quite possible that clockmakers in several different parts of the world could have turned to the use of wood for building timepieces wholly without knowledge of any outside activities, and also possible that the use of wood cropped up in about the same general period. Wooden clocks are known to have existed in Germany as early as 1667; roughly somewhere about the same period wooden clocks appeared in Scotland.

The fact that some of the early clocks built by the celebrated John Harrison (1693-1776) were of wood is generally overlooked by horologists.

No doubt you are correct regarding Twiss Bros. clocks, and they must have come about the height of the wood clock production. J. and H. Twiss are listed as operating in Montreal, Canada. Active about 1828 was the firm of B. & H. Twiss of Meriden, Connecticut. It seems that there may have been three brothers in this firm, Benjamin, Ira and Hiram.

There are also wooden clocks with "Hiram Twiss, Meriden, Connecticut," in them. Hiram was granted two patents on clocks about 1834. No doubt the Canadian firm made the very best use of its Connecticut connection.

Your general description of the MacDonald clock sounds very much like German work. It is quite possible that some Dutch trader could sell a German clock. However, we know very little about the Dutch using wood in clock work. Perhaps some of our readers could tell us something. Three hundred years takes it quite a ways back. Does it have two hands and the full 60 minutes marked within the minute track?

I'd hesitate to question the record of a Scot, leastways a MacDonald. I believe the clan is reckoned the oldest and most famous of the Scottish clans, descending from Donald, the grandson of Somerled, King of the Isles in the 12th century. I'd have to check with Friend George Hogg, our U.H.A.A. vice president, to make sure, and he would probably ask if I referred to the Macdonalds of Clanranald, the MacDonalds of Sleate, or the MacDonalds of Glengarry.

You mention modern lantern pinions—that all depends, for the lantern pinion was suggested by Leonardo da Vinci (1452-1519).

J. E. C.

Dear Mr. Coleman:

We have received for repair a 400-day German clock which is approximately 30 years old. The only trademark on it is "Geo. Borgfeldt & Co." The suspension spring was badly mutilated, so we replaced this with a new one. The clock now runs way fast, undoubtedly due to the suspension spring not being the proper one for this clock.

Could you tell us where we could probably get the correct spring for this clock?

H. R. FLAMMANG

Dyersville, Iowa

Dear Mr. Flammang:

We cannot give you a distinct strength on a Borgfeldt, 30-year-old, 400-day clock. And besides, there is quite a chance that the pendulum may have been altered in weight in these years.

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ply you with the new Horolovar suspension springs—these may be had in a dozen-assortment which contains some ten different strengths. We can tell you that your clock was designed to beat or tick eight times to the minute. In the above mentioned assortment, each spring is in a separate compartment. You may take a spring, place the top and bottom chocks on at the correct length (no need to put the fork on) and hang the pendulum on. Set it in motion and count the beats by a stop watch or your sweep-seconds regulator. If it beats more than an even eight times per minute, it is too strong. Replace it in the compartment from which you got it and try the next weaker spring until you have a spring that will come out even on say 16 beats in exactly 120 seconds.

Any spring so counted or vibrated will be well within the scope of the regulator (the beat is made with the regulator in center) and is the corrrect strength for that clock.

J. E. C.

Dear Mr. Coleman:

A customer has a battery-operated clock and would like to have it run by house current. I would like to know just what kind of replacement would have to be added to it and where I might buy it. On the face is "L. Bourbeaux, Electrique, France, Belfort," and on the back is "Ste Ann Establisements, L. Matot, 23 Rue de la Michodeme, Paris." Inside is the number, 58610.

ROGER T. WHALEN
352 Main Street
Holyoke, Massachusetts

Dear Mr. Whalen:

I'm awfully sorry, but we have been unable to locate either "L. Bourbeaux" or "Ste Ann Establishment" in any available lists.

Quite early in the electric clock era, the French built a great many battery-driven clocks. Naturally they are pretty scarce over here. Perhaps if you could send us a sketch or photo, with a description of your piece, it would help identify it. A great majority of them were operated on one cell, 1½ volts. If we assume that yours is a 1½ volt circuit, then your problem is to reduce your house current (60-cycle alternating 110-volt) to 1½ volt direct current.

To do this and keep the necessary equipment within the clock is generally impossible. When it is done, they usually use a step-down transformer, first reducing the house current voltage, then a rectifier. If it is converted to direct current, it may be necessary to further cut down the current either by a choke or rheostat to the required 1½ volts. The unit can be encased in a cabinet, placed in an unseen spot and the 1½ line run to the clock. So far as we know, such a unit is not on the market. However, any competent electrician can build one for you. Your first problem is to determine the correct voltage, then have the unit built to it.

Use of such a unit makes the clock subject to current interruptions, and it is our thought that batteries are still more satisfactory. The chances are that your customer's desire to switch to house current is prompted by difficulty encountered in getting the right battery. Your electrician can help you here. Battery construction has undergone vast improvement in the past few years, and there is nearly always room in these clocks for an improvised or "built-up" battery. If you will supply a sketch or photo, I'll be glad to try some French source for concrete data.

J. E. C.

Dear Mr. Coleman:

I have an old grandfather's clock which has no name or numbers. It has wooden plates and brass wheels, and it has a third hand to tell the day of the month. The pendulum rod is wood and the suspension spring is brass, 1 mm. thick. The bob is a brass shell, (the front) filled with lead. The weights are cans about three inches in diameter and 12 inches long, filled with iron and sand.

It has a bell on top that strikes only on the hour. This clock runs in spurts, sometimes for a week or ten days and then stops. When I get it started it might run a day or two, and I just can't keep it going steady. Can you please suggest something that could help me? How much weight should I have in the cans, and how heavy should the bob be? Could the suspension be too strong?

I have no idea whether the thing is all original or not. It was supposed to have been brought here from the East in a covered wagon. It has been in storage for years and just now has been brought to me for repairs or to be put in running order.

H. A. BOND

4435 23rd Avenue
Moline, Illinois

Dear Mr. Bond:

There must be some mistake. One millimeter is entirely too thick for any suspension spring. Brass isn't the most desirable, but practical results are sometimes obtained with it.

The clock you describe is German—there are quite a few of them around. You did not give details of the construction, but most of them have a frame (wood) held together by two (sometimes four) posts, also of wood. The strike and time trains are almost in line, and under separate removable plates at the back.

Now, if your weight is sufficient to drive the clock for a week or ten days, it does not suddenly become less or lighter; some condition within the movement serves to create additional friction. What that is, you will have to locate the hard way—by trial and error.

Generally it's the frame; however, you always have worn or loose pinions, worn wheels, bearings that need bushing, etc., always with you. Some of these clocks have wood arbors. If so, look out for wheels loose on the arbor. First of all, look to that frame—make sure it is very tight, tight enough to withstand the wiggle and warp that comes from winding heavy weights.

Chances are the pendulum ball you have is the original. At any rate, you probably have a wider latitude in the weight of the pendulum than almost any other point of clock construction, so several ounces too much or too little will not matter one way or the other. In this type of construction, the driving weights aren't too critical either. Yours sound like the original—another chunk or two of scrap iron added isn't considered botch work on them.

If you are accustomed to working on clocks, listening to the tick is a pretty good

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indication of whether or not you have too much weight. There is no occasion for the movement to labor or hammer as it ticks. Also, close listening over relatively long periods should indicate to you whether or not the train is running smoothly. If, by reason of rough, worn pivots, worn wheel teeth, worn pinions or a shift in the frame, the regular friction is varied, it will show up when the blow is delivered to the verge pallet, i.e., when friction is decreased, the escape wheel gets more power and the clock ticks louder. When it is increased, less power is delivered to the escape wheel and you get weak ticks or strokes. Generally, the pinions are of the lantern type and you can easily insert new stays. Where the active face of the wheel teeth shows excessive wear, one can nearly always "turn it over," thus presenting the new and unworn side to the pinion.

These clocks are far from "railroad" timekeepers, and the strength of the suspension spring isn't critical either—better to be on the light side. In fact, we've seen many of them with a clevis suspension (like that of the cuckoo clocks) use a very light steel spring, somewhere in the neighborhood of a quarter-inch wide, and anywhere from one-and-a-half to two inches long.

J. E. C.

Dear Mr. Coleman:

I have a customer who owns a clock that has the following description: It is a Horton calendar clock made by the Ithaca Clock Works, and has the day cylinder, month cylinder and date dial. It has patent dates, 1866 and 1867. I repaired and cleaned it and it runs fine, but the customer wants to know if it is an antique and if it has value as such.

No price, or as you say, valuation, is wanted, just the assurance that it is of value. I am sending you a rough drawing of the clock.

PHIL LUBSEN

1218 West Front Street
Plainfield, New Jersey

Dear Mr. Lubsen:

Thank you very much for your attitude on price. We would think that the clock you describe falls well within the general concept of antique clocks, and therefore has value as such.

Until quite recently, it was a bit difficult to point to any one special date or dividing line for antique clocks. In a dividing line for antique clocks. On page 34 of this magazine, you will find an article by Dr. Willis I. Milham, author of "Time and Timekeepers" (1923) and whom I consider the leading authority on this particular question.

The Ithaca Calendar Clock Company was formed by Henry Bishop Horton (1819-1885) in August of 1868, who held seven patents on calendar clocks. They manufactured about 40 styles of calendar clocks, and I believe Mr. Horton obtained his eighth patent about 1868. The firm was liquidated about the time of the first World War.

J. E. C.

Dear Mr. Coleman:

An 80-year-old gentleman from Connecticut showed me some real old and out-of-the ordinary watches. One is 18-size and engraved on the back of the works is "Imperial Duplex." The case is stamped on the front and back, "Warranted Sterling, Fine." It is apparently 11 jewels, key wind and key set.

Another one, a chronometer, and according to his book, this watch was ordered made in 1623, to be the most accurate possible timepiece, 22 jewels. Engraved on the plate is "T. Maston, London, 5196." It has a chain drive.

Another calendar watch gave the month and day of the week. In addition, he had a lot of other old relics. He said that he had probably 50 or 100 clocks back in Connecticut, and that he has never sold a watch. He also had a watch which was a perfect sphere, about one inch in diameter, with glass on both sides, stamped "7 jewels," and a gold band, like a finger ring, around the circumference of each half.

Can you give me any information about these watches.

C. E. LEMMONS

Kincaid, Kansas

Dear Mr. Lemmons:

Watch questions are always difficult for Clockwise and Otherwise, since we are supposed to concentrate on clocks. In addition, brief descriptions often fail

to indicate some small point that might definitely date or indicate the piece.

Obviously the Imperial Duplex must be some sort of trade name, rather than that of the maker. So far as this writer knows, no one has as yet attempted to bring out a list of the various trade names, or even those of merchandisers who had their names placed on dials and cases. This sounds (your description, that is) on the English side. Was that sterling case hallmarked? If so, we could date it from a pencil rubbing of that mark. It is a rare thing when these old watches have been re-cased skillfully enough to defy detection; thus, as a general rule, the hallmark date is considered reliable for dating purposes.

Thomas Maston lived in London around 1777. Only two Mastons are listed and this is the only one from London. The date, 1693, is entirely too early, if by "chronometer," you mean a detent escapement. In fact, the lever escapement dates from 1759 (Thomas Mudge, 1715-1794) and the detent is even later, about 1783. (Thomas Earnshaw, 1749-1829.)

There are a number of these glass ball watches floating around. It would require a more detailed description before we could tackle any identification. It would be most interesting to get into those hundred clocks you mention, especially if they date way back. Write in detail about the last—the glass ball watch.

J. E. C.

Dear Mr. Coleman:

I read your column with interest and have looked through back issues for an article on Waltham clocks—have overlooked it or not seen any. Recently, I received for repair a Waltham grandfather clock. It is a quarter-hour chime, with three trains. It is very well made, with a gong strike. Stamped on the plate is "Waltham Clock Company, U.S.A." and the number, 4090. Movement plates are 9¼ inches wide and 8 11/16 inches high. There are two repair or service scratch dates, one is 1933 and the other, 10-18-12 (the year 1912, I presume). The escape wheel has worn the verge so badly that it is very shallow. I sent an air mail letter to the Waltham Company about three or four weeks ago, inquiring about a new verge. I have not heard yet, and I have

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little hope, as it is probably obsolete.

The top of the case has a very large hood which slides off to the front to expose the movement to work on. Can you tell me about when this clock was made and if it was made by Waltham Watch Company? I probably will have to make a new verge to fit, or have one made. The verge is screwed onto a brass collar on the verge axis, and is about 3/16 inches thick, and all one piece of steel. The verge encloses ten teeth and the escape wheel has 30 teeth. The pendulum rod is 42 inches long. I am sending you a drawing of the movement.

Any information about the history of the clock or manufacturer, and tips about making a new verge will be appreciated. The only thing I am stuck on is obtaining the right material and the angle of the verge post at contact points with the escape wheel.

JOHN BARTLETT

2501 Pacific Street
Napa, California

Dear Mr. Bartlett:

If you are pressed for time, I suggest that you write to Howard Clock Products, Inc., 256 Charles Street, Waltham, Massachusetts. If not, we hope to forward more definite information in a short time.

Waltham verges are very easily demounted, and if you can secure a new one, it will be both quicker done and cheaper for you. Our Waltham data is quite sketchy—our latest material catalogue is dated 1948, and in this volume no grandfather clocks parts are listed. A 1935 merchandise catalogue of theirs indicates that they were selling these grandfather clocks at that time. Palmer records that the Waltham Watch Company purchased the Waltham Clock Company in 1913, that from 1923 to 1925 the name was changed to Waltham Watch & Clock Company, and that in 1925 it was changed back to Waltham Watch Company.

J. E. C.

Dear Mr. Coleman:

I have read and enjoyed your department in the American Horologist & Jeweler for the past three years, and now I finally have a question of my own to ask. I recently acquired a Bulle battery clock in deplorable condition. From curiosity, I spent considerable time on it and now have it running, but it is not dependable. It stops occasionally. I used two short lengths of a small watch mainspring to hang the pendulum, and used a 1½-volt battery.

Are 1½ volts enough? And does the fork have to bang against the banking pins? Also what is the principle which makes this clock run? I can find no contact points which would reverse the direction of the pendulum. Any information that you may have will be much appreciated.

C. W. HUMESTON

676 Gretna Green Way
West Los Angeles 49, California

Dear Mr. Humeston:

Let's take your last question first, the principle: the curved iron bar over which your Bulle pendulum swings is a permanent magnet of special construction, i.e., magnetized so that the center portion is north-seeking magnetism, while the two ends are south-seeking polarity.

The ball portion of your pendulum is in reality a coil of insulated wire, and you've already noted, I'm sure, the two leads to it. Now when contact is made to the battery circuit, the pendulum becomes an electro magnet or solenoid. The magnetic reaction between the permanent magnet and the solenoid magnet of the pendulum is the source of power by which the pendulum is driven.

Note that the rocking fork (similar to a lever fork) situated upon the back of the clock movement near the top of the pendulum has a slot to take one of the connections upon the pendulum rod just as the lever slot takes a roller jewel in a watch. Also note that upon one side of this slot is riveted a very small piece of fiber (red); this fork is the contact, since one leg of the circuit is carried by the clock frame (ground) and the fiber is so placed to prevent contact upon that side when the pendulum swings to that side.

Observe closely how your clock is wired. The negative or minus side of the battery is connected to the clock frame (ground). This negative leg of the cir-

cuit is carried from the frame to the pendulum rod by a little spiral spring-like connection alongside the suspension, thus one of the pendulum coils is continually connected to the negative pole of the battery, and the other end of the pendulum coil comes up the little wire alongside the pendulum rod and its connection is terminated in the pin connection which acts in the rocking fork like a roller jewel. This rocking fork is connected with the positive or plus side of the battery. So let's say the fiber insulator is on the left side of the slot; then the connector pin only completes the circuit when the pendulum swings right and the pin touches metal. Upon the swing to the right at about the time the pendulum is "center," this connection is made—circuit closed. The pendulum coil sets up its magnetic field and becomes obedient to the law of all magnets which repel like poles and attract opposites; and thus both repulsion and attraction give it a shove to the right. As it moves in that direction it breaks the circuit, and gravity brings it back. Upon its next swing, the process is repeated.

In your Bulle, the pendulum drives the clock (not the clock drives the pendulum, as in spring clocks) by means of a ratchet working a 60-tooth wheel. The pendulum is approximately 11 inches, or half-seconds, and since the ratchet system necessarily can advance the wheel upon one swing, the clock is advanced once each second.

One and one-half volts—one dry cell—is the correct voltage. The negative (minus) side connects to the clock frame.

Your suspension is entirely too strong. Originally, these Bulle pendulums are suspended by silk—a piece of grosgrain ribbon (light) is ideal. At the moment, I can't lay hands on the measurements, but you can judge its width by the brass chocks into which the silk is clamped. As to the length, make it so that the pendulum hangs with the fixed, curved magnet bar in the exact center. That is why the little spiral spring, resembling a hairspring, is placed alongside the suspension as a connection to carry the current on down to the pendulum coil.

Once in order, your clock ought to start of its self from a dead stop. The pendulum motion should gradually accelerate—

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each swing a little larger—until it reaches full amplitude, just a little short of bumping the end supports of the curved magnet bar, in three or four minutes.

The Bulle is one of the better timekeepers of the battery clocks, and yours should make you a satisfactory clock. You were lucky to locate it. Don't know the whereabouts of another wreck, do you? We once owned one, but gave it away, fully expecting to replace it, but haven't spotted a loose one yet. If you have other questions, don't hesitate to write.

J. E. C.

Dear Mr. Coleman:

I am in dire need of a spring to fit a Welch clock. The spring is a double one, the top half of which is broken at the center. As you know, the two springs are contained in a thin brass barrel; the bottom half winds opposite to the top, and the two are connected by a brass leaf and are separated by a thin slotted sheet of metal.

The broken spring is eight millimeters wide and one millimeter thick; at present it is about three and one-half feet long. Judging from the appearance of the broken end, it has been broken before, and quite a sizeable section is missing. I have tried drawing the temper to the dull grey, as recommended in Garrard's book, drilling and broaching the hole, but no luck. I am hesitant about riveting a section so close to the arbor. If you can supply me with such a spring or give me the address of someone who can, I shall be very grateful.

The clock was made by E. N. Welch, and is designated on the case as being the Albani. Any historical information you can supply regarding this will also be appreciated.

As long as I am bothering you, I may as well make it good. May I ask for whatever information you can supply regarding the history of a Chauncey Jerome weight clock, hour-strike only?

Needless to say, I am an avid reader of your column and have derived much worthwhile information from it. May you live forever. As soon as I read the last issue I ordered and received my copy of Donald DeCarle's new clock book you mentioned. It certainly should be rated as a "must."

JOHN E. HEALY

221 Shepherd Avenue
South Charleston, West Virginia

Dear Mr. Healy:

Thank you for your good letter. The double mainspring arrangement you describe in the E. N. Welch clock was patented by Mr. Benjamin B. Lewis on November 22, 1881. (Pat. No. 249,845.) It was used principally in their Patti model mantel clock, which we described in detail in the May, 1948 issue of A. H. & J.

Elisha N. Welch (1809-1887) consolidated his clock companies under the name of the E. N. Welch Manufacturing Company in 1864. It was one of the large Bristol producers up to about 1897, when it went into receivership. It was reorganized in 1903 as the Sessions Clock Company, and as you know, is in operation today.

Albani is the model or catalogue name, and would have to have one of the old Welch catalogues to pinpoint its date; however, since your clock is equipped with the Lewis spring (1881) it must have been produced between 1881-97.

It is a very rare thing when the weight-type clock you indicate struck the halves. It would require a detailed description of the clock and case to approximate its date of manufacture. Jerome is the only clockmaker of the Connecticut period to write a book on clockmaking. Mr. Hiram Camp did write a short history, just enough to make a small pamphlet, which Mr. English permitted me to publish in *Horology* for March, 1938. While active within the clock business, we never find Mr. Camp's name on clocks.

I perceive you are a lover of books as well as clock history, and am therefore mailing you one of my prized volumes—the Jerome history. From it you will get a good over-all picture of Jerome's activities and their dates. It isn't a large book, so it won't take you long to read it. Be sure to insure it when you return it.

J. E. C.

Dear Mr. Coleman:

My problem briefly is this: the school I attended taught watchmaking only, and I have customers who want their jewelry

repaired. Can you advise me of a good book covering the basic methods used in store repairs of jewelry? Any advice you may offer will be greatly appreciated.

RALPH M. SAFFER

27 Helena Street
Rochester 5, New York

Dear Mr. Saffer:

Your problem from the standpoint of customer demand is understood, but it remains a question whether a "clockmaker" might have all the answers. I'm a great believer in "home study," and see no reason that you cannot by diligent application, in due time, prepare yourself to handle much of this type work.

You may obtain the following books on jewelry and jewelry repairing from the A. H. & J. Book Department—the price is given for each book—you must add postage (ten cents for each book).

B-115, "Jewelry, Gem Cutting & Metalcraft," by Baxter, $3.00, 287 pages, 170 illustrations describing all phases of jewelry repairing.

B-159, "Jeweler's Pocket Reference Book," by R. M. Shipley, $2.75, 355 pages, illustrated. Handy reference to all questions on silver, gems, design, style, etc.

B-194, "Jewelry & Enameling," by G. Pack, $3.50, illustrated work manual and reference book for instructors and students.

B-165, "Establishing & Operating a Jewelry Store," 15c, a U. S. Government pamphlet.

B-195, "Fundamentals of Soft Soldering," by Charles Yerkow, $2.25, illustrated book covering the principles of soft soldering for expert and amateur, 96 pages.

B-170, "Gem Cutting," by J. D. Williams, $3.50, 224 pages, illustrated, for gem cutting with simple, inexpensive tools.

B-173, "Jewelers Workshop Practices," by R. Linick, $6.00, 516 pages, illustrated, dictionary covering every phase of jewelry work with exact formulas.

B-210, "Small Jewelry," by Smith, $1.50, 109 pages, illustrated, explaining the ease and simplicity of making items of jewelry for the amateur craftsman.

B-220, "Metalcraft and Jewelry," by Emil Kronquist, $3.00, a well written and well rounded volume completely covering metal craft and jewelry for the beginner and expert.

B-209, "Silverwork & Jewelry," by H. Wilson, $4.75, an English work of 496 pages covering every phase of jewelry.

B-217, "Creating Jewelry," by Andrew Dragunas, $3.00, 52 illustrations, 146 pages, a concise introduction to the craft of homemade jewelry for fun or profit.

B-160, "Handbook of Gem Identification," by R. T. Liddicoat, Jr., $4.50, 283 pages, beautifully illustrated.

Trusting that this will be of some assistance, and with the assurance that we will be glad to make another try if you feel other data is needed.

J. E. C.

Dear Mr. Coleman:

Although I am not a subscriber to A. H. & J., I frequently read your column, as a very good friend of mine, Mr. Edward F. Hopkins of North Brookfield, Massachusetts, receives the magazine.

I am sending you some newspaper clippings taken from the Sunday, September 28, issue of the Waterbury American magazine section, which was a special edition in conjunction with the recent 150th anniversary of the brass industry. Knowing that these articles would be of interest to you, I am sending them in appreciation of all the information I have gleaned from your column.

I am a member of the National Association of Watch and Clock Collectors. My specialty is wood works clocks made in Farmington, Connecticut, of which I have eight by George Marsh & Company; Marsh & Gilbert; Seymour, Williams & Porter; Williams, Orton & Preston; and Orton & Preston.

Best regards, and hope to meet you some day.

KENNETH D. ROBERTS

Box 64
West Cheshire, Connecticut

Dear Mr. Roberts:

The clipping is very much appreciated, also your remarks about our feeble efforts. We've mentioned upon a number of occasions how much we like to get such items. They are all preserved—we try to file them under some general heading

subject, and quite often they enable us to supply some wanted bit of data by reference to them. Very few people actually retain clippings, articles, etc., relating to clocks and clock works, and practically none of those who do is doing it for the benefit and use of the trade—free.

I note that you mention that you are not a subscriber to A. H. & J. Of course we'd like to have you upon the list, but when mentioning that Clockwise and Otherwise endeavors to use its files for the trade, I do not intend to convey any thought that our files are in any way restricted to just the trade or A. H. & J. subscribers. We shall do our very best to supply answers to any and all who have questions pertaining to clocks, etc., without charge.

Cooperation is our theme—we feel that we have a definite obligation to those within the clock repair trade; however, we also, as a member of that trade, have some obligation to the entire public, especially when it concerns our trade.

Your list of firms represented by their wooden clocks is interesting. Offhand, I'd say that possibly the latter three may be 8-day shelf clocks. Are they? Also, I'd say that their plates may be mahogany instead of oak, as generally found. I have a Seymour, Williams & Porter 8-day shelf movement, with mahogany plates, and it has the count wheel mounted between the plates. Looking forward to another of your good letters.

J. E. C.

Dear Mr. Coleman:

I need a clock mainspring winder, and I would like to build one. When I worked in the navy yard I used one. There wasn't much to it, and if I had the measurements, I'm sure I could make one. I'm sending you a drawing of the one I used in the navy yard.

Could you tell me where I could buy blueprints to make a mainspring winder on the order of my drawing?

M. L. HOFFMAN
24 North Charlotte Street
Pottstown, Pennsylvania

Dear Mr. Hoffman:

The writer is quite familiar with the mainspring winder you indicate by your drawing. I owned and used one for a number if years, but have long since discarded it for some of the later models.

Drawings and/or blueprints for making this winder, do not, as far as I know, exist, and not having my old winder, I can't copy same for you. I have a number of suggestions:

(1) There are better winders on the market at a reasonable price. Write to Mr. Barny, 218 East 59th treet, New York 22, New York, or Charles Terwilliger, Box 229-A, Bronxville 8, New York. Mr. Barny is marketing a winder that he himself builds and Mr. Terwilliger is marketing a special winder he imports direct. Both winders are in the medium class.

(2) I think the very winder you illustrate is being manufactured in Switzerland today, and suspect that your own local wholesale house can obtain same from one of their regular importers for you at a very reasonable price.

(3) If you especially wish to build it yourself, I'd guess that some of the older watchmakers of Pottstown have one laying about which they would be glad to lend you as a pattern—and that would be even better than the prints.

Now if none of the above suggestions "pan out," write me again and I'll see if I can't borrow one somewhere for you to use as a pattern.

J. E. C.

"I don't know whether you'd like this watch—it doesn't turn on the radio, start your coffee perking or anything else—all it does is tell time."

New Swiss Watch Calibers

(CONTINUED FROM LAST MONTH)

19

5¼—8⅛

(H) **75**

84

10½

(A) **120**
122 bevelled

41

9¼

(F) **700** AUT. SC
705 AUT.

55

11½

(F) **694** AUT SC
Date opening with corrector

55

11½

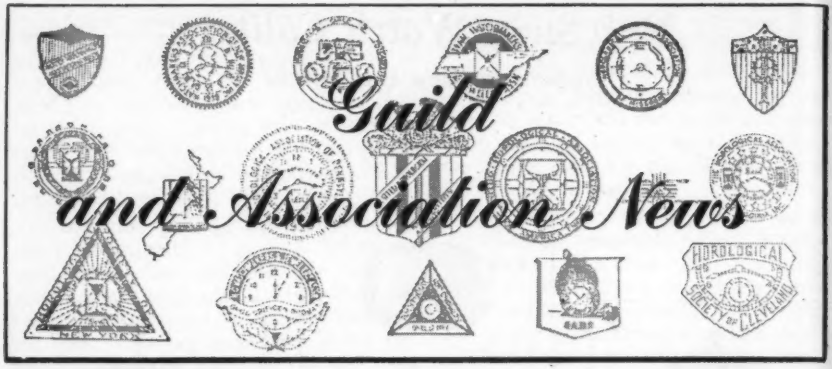
(F) **692** AUT. SC
Date opening

55

11½

(F) **693** AUT. CLD SC
Moon phases

Shown here are the newest watch calibers (movements) to be added to Part One of the Official Catalogue of Swiss Watch Repair Parts. Current owners of the catalogue are advised to clip each box and paste in the blank spaces to be found in the loose-leaf publication. The page number appearing in the upper right hand corner of the box is provided as a guide.



IOWA ASSOCIATION ELECTS NEW OFFICERS

The Capital City Horological Guild of Iowa, at their regular meeting in November, held an election of officers for the following year.

The present officers will hold office for another year. They are: President, Dean Crank; Vice-President, Norman Richardson; and Secretary-Treasurer, Robert Chantry.

The board of directors consists of George Crank, F. C. Brown, Howard Vestal and Henry Barhite.

The following committees were appointed: Entertainment and Program, Bob Penland, Ray Wiley, Howard Vestal and Gordon Gemmill, chairman; Membership, George Hogg and William Braklow, Sr.; Publicity, Al Weise; and Historian, George Crank.

The Capital City Guild is urging every watchmaker to become a member, and to make Des Moines the largest guild in Iowa.

MINNEAPOLIS GUILD OBSERVES FAMILY NIGHT

The fourth annual "family night" of the Minneapolis Guild was observed recently with 170 members in attendance. Following a steak dinner, donated prizes were awarded in bingo games, followed by musical entertainment and a sleight-of-hand performance.

At another recent meeting, a joint session of the Southwestern, Central and West Central Guilds was held in Redwood Falls. Several stores were visited before the serving of a turkey dinner. Talks were given by Aubrey Dirlam, state representative, one of the promoters of the Minnesota licensing law which was passed in 1943. He gave an interesting review of this law and told why it is of benefit to both watchmakers and the public. W. C. Westphal, president of the examining board, spoke on the subject, "How to Get Better Performance Out of Wrist Watches," V. J. Erickson spoke on "Why Every Watchmaker in Minnesota Should Be a Member of the State Association." Mr. Mitchell Keller, secretary of the state association, reported on a new plaque being developed for members. Leslie Dewey gave a report on the U. H. H. A. convention held in California in July.

New officers of the Minneapolis Guild are David Klemke, president; Carl Krueger, vice president; Fred Betlack, secretary. William Sorenson was re-elected treasurer.

ILLINOIS WATCHMAKERS TOUR MARSHALL PLANT

Through the courtesy of Jack Marshall, vice-president of the C. & E. Marshall Company, the Illinois Watchmakers Association made a tour of the Lathe Manufacturing and Tool Production Departments of the Marshall plant at Chicago recently.

Beginning with a talk on the manufacturing of lathes from the invention of the split collet chuck by Moseley, Plant Superintendent Fred Cromar illustrated the most important of the 185 operations necessary to make a lathe with actual castings and parts in process of finish. The meet-

ing then continued on into the machine shop where each part of the lathe as it was being processed was explained by Shop Foreman George Wauer who also put each machine in operation to show what it did.

It was interesting to note the respect for the lathe grow in the watchmakers as the lathe took shape from a rough casting on the shaper bed and on through the grinding, drilling, lapping, polishing and finishing departments until it reached the testing bench as a finished product where tolerances of accuracy of two thousandths of an inch are maintained.

The tour continued through the plant observing the manufacturing of Tri-duty, Watchcraft and Moseley staking tools, the rapid production of the screw machines on parts for mainspring winders, the faultless hardening of punches by an induction coil, the output of the plastic extrusion machine and the final assembly of the Marshall watch cleaning machines.

After refreshments, Fred Cromar furnished an additional treat by showing a wonderful collection of color slides taken on a European trip with J. K. Marshall.

The meeting closed with a brief sketch of his part in the start or the Illinois Watchmakers Association by Carl Ander in a joint meeting with the now deceased honorary members J. F. Macke and Fred Lund when the idea of a Chicago Horological Guild was formulated.

'QUESTION—ANSWER NIGHT' HELD BY NEW YORK GUILD

"Question and Answer" night was held recently by members of the Horological Society of New York when they held a meeting at the Capitol hotel.

Those making up the panel for the evening's discussion were Dr. A. L. Rawlings, Foster H. Brown, J. P. Savary, E. K. Johns, and I. Liemer.

OFFICERS FOR '53 NAMED BY LOUISIANA GUILD

The Alexandria (Louisiana) Watchmakers Guild held an election of officers for the coming year at a recent meeting.

Those elected were: President, James Washburn; First Vice-President, J. V. Martine; Second Vice-President, C. T. DeVore; Secretary-Treasurer, Fred C. Kline.

The apprenticeship council, consisting of C. L. Kline, O. D. Patton and A. W.

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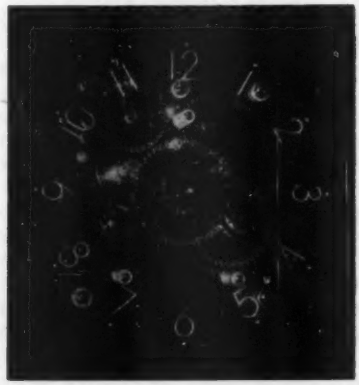
Mounce, were re-elected for another year.

A slide lecture on "Swiss Chronograph Dials," was given by John Crossno and George C. Adams. It was shown through the courtesy of The Watchmakers of Switzerland and was greatly enjoyed by all. The lecture showed the different styles of dials used on chronographs and explained their various uses.

PLASTIC CLOCK



The photo shows a seconds-beat striking clock built by Don Berryman, a student at Elgin Watchmakers College. The clock is a reproduction of one of our early American wooden clocks. The plates, dial and wheels are built of plexiglas. It has a seconds-beat pendulum and recoil escapement. It strikes the hour on a glass bell jar, and has steel pivots which are inserted in plastic arbors and brass bushings inserted into the plates, thus making a free and easy running train. The plates are 8 by 9 inches and the dial is 12 inches square. The figures are engraved into the back of the dial and the minute marks are also drilled into the back of the dial and filled with red enamel. The hands are made from translucent red plexiglas and the combination of the all clear plates and wheels for a background makes the dial and hands outstanding. Berryman also built the case for the clock, standing six feet tall, having glass sides and glass door with an electric bulb in the top of the case that throws light onto the movement. He accomplished building the clock and case in six weeks' time.

BOOK REVIEW

Treatise on Modern Horology

By CLAUDIUS SAUNIER

A Reprint Published by W. & G. Foyle
London, England

We are very glad to see the new, complete word-for-word reprint of Claudius Saunier's "Treatise on Modern Horology" —844 pages, three inches thick, for $12.50.

This book has for many years been the best source of information available to the watchmaker and has been, up to the time of reprinting, a collector's item, selling anywhere from $25.00 to $75.00 per copy. Now, at $12.50 per copy, it is a real buy.

All of the original colored copper plates —which in many cases were missing from the books found by collectors because they were inserts—are bound in this book in their proper sequence.

The contents of the book, which will be familiar to those who either own or have had one available in the past, are laid out in sections:

Escapement—Verge, cylinder, duplex, detached lever, chronometer, clocks and timepieces.

Depths—Trains—Definitions, forms of teeth, accurate proportion of pinions, causes of stoppage.

Motors -- Weights, mainsprings, stop works.

There are miscellaneous articles relating to balance springs, adjusting, etc. There are also many charts and tables useful to the watchmaker and clockmaker, such as pendulum lengths, conversion charts—the information we are always looking for and can't locate.

This book, we feel, covers our field as no other book, past or present, has. And it is a very worthwhile addition to the clock repairman's library.

JAMES L. HAMILTON,
Author of "Timing Manipulations."

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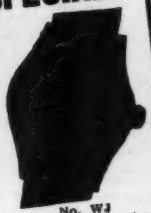

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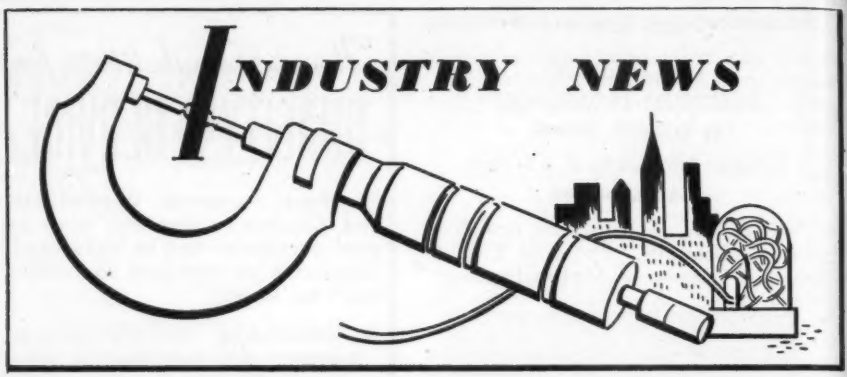

SWISS ANNOUNCE WINNERS IN INSPECTION TIME CONTEST

David Musik, of Washington, D. C.; Leon Kaplan, of Slope Jewelers, Brooklyn, New York, and Michael A. Fiorillo, of Laredo, Texas, have been announced as the three first prize winners in the fourth annual Watch Inspection Time Contest, sponsored by The Watchmakers of Switzerland.

Each has his choice of a complete Swiss precision jeweling tool set or $150 worth of any Official Packaged Swiss Replacement Parts.

Other winners are:

Second Prizes (Each a fully equipped Swiss staking tool set or $100 worth of Official Packaged Swiss Watch Replacement Parts): Chester W. Hoener, of Hokamp-Keis Jewelers, Quincy, Ill.; and Erwin Biederman, of Lee Heights Jewelry, Cleveland, O.

Third Prizes (Each $50 worth of Official Packaged Swiss Watch Replacement Parts): Byron W. Mansfield, of Arcade Watch Shop, Providence, R. I.; Wilson L. Suggs, of The Time Shop, Rantoul, Ill.; Henry Feldman, of Brookline, Mass.; Earl Woodley, of Woodley Jewelry, Beaumont, Calif., and Edward J. Scherzinger, of Jim Scherzinger, Jeweler, Grafton, Wisc.

Fourth Prizes (Each $25 worth of Official Packaged Swiss Watch Replacement Parts): Fred C. Kline, of C. A. Schnack's Jewelry Co., Alexandria, La.; Richard R. Absher, of Bristow-Gross Watch Repair, Newport News, Va.; Homer D. Cozad, of Geneva, O., and Eimi Kuramoto, of Cortland Jewelers, Winona, Minn.

Material distributors who will receive "surprise" awards as a result of listings by winners as their regular jobbers are: Greenan Watch Supply Co., Washington, D. C.; Fine & Co., New York City; Swartchild & Co., Chicago; Colman Bros, Inc., Cleveland; L. A. Chasan & Co., Providence; C. & E. Marshall Co., Chicago; Haselton Co., Boston; E. W. Reynolds Co., Los Angeles; Kilb-Beck Co., Milwaukee; Southland Jewelers & Supply Co., New Orleans; Philip Sloves & Sons, New York City, and Esslinger & Co., St. Paul.

FEDERAL JEWEL BEARING PLANT TO BE OPERATED BY BULOVA

The domestic manufacture of jewel bearings, an entirely new American industry, has been established in Rolla, North Dakota by the Office of Defense Mobilization and will be operated by the Bulova Watch Company.

The new enterprise will initially employ about 300 persons and is expected to furnish the armed forces' instrument and timepiece sections with 10 million jewel bearings a year. The chief purpose of the new industry is to relieve U. S. dependency on Switzerland for an important defense item.

GEMEX WATCHBAND CO. SPONSORS 'STORK CLUB'

The glamorous "Stork Club" half-hour television show, hosted by Sherman Billingsley, will be sponsored on alternate week basis by the Gemex Co. of Union, N. J., one of the oldest manufacturers of expansion watchbands, effective January 3, it was announced by Fred M. Thrower,

CBS-TV Vice President in Charge of Network Sales. The sponsorship celebrates the 35th anniversary of Gemex, and is part of the firm's expanded program of advertising and merchandising.

The "Stork Club," broadcast every Saturday, 7:00-7:30 P.M., EST, orginates in the world famous rendezvous, the only establishment of its kind equipped with telecasting facilities providing home viewers with a window on the place where the elite meet to dine and enjoy sparkling conversation. The "Stork Club" series has been a popular CBS-TV feature since July 7, 1950.

Unlike other famed restaurants, the Stork Club needs no floor show. The conversation of its extraordinary clientele is far more exciting. Host Sherman Billingsley chats informally with some of the world's most celebrated figures in the fields of art, business, sports, diplomacy, government and show business. Such colorful personalities as Lord Beaverbrook, Gloria Swanson, Charles Boyer, Joe DiMaggio, Admiral Halsey, Margaret Truman and King Peter of Yugoslavia are typical guests on "Stork Club" broadcasts.

A regular feature of the series is the Glamour Panel, comprised of leading socialites who discuss questions of general interest submitted by the television audience. Home viewers have indicated a keen interest in the Glamour Panel. They want to know what society leaders' views are on timely, pertinent topics. And they want to know, too, what latest styles are given the authoritative stamp of high fashion approval by Stork Club guests.

Filling the cup of conviviality to the brim are the famed singers of stage and screen who, with the informality of house guests, rather than professionally, serenade the Cub Room each week. Sometimes the "performers" drop in on their way to the theater, such as Bill Tabbert of "South Pacific" and Vivienne Segal of "Pal Joey." Anne Jeffreys and Robert Sterling, relaxing in New York after a long bout of film-making, provided the music for a recent broadcast.

Sherman Billingsley, charming and debonair, is the perfect host in the "Stork Club." His reputation for generosity is probably unapproachable. His gifts to broadcast guests include countless orchids,

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B) Watch Band & Strap Catalog

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champagne, caviar, perfume. Home viewers are frequently rewarded with pedigreed dogs for submitting Glamour Panel questions. Chief of his own gifts, however, is a natural grace which projects the real appeal of the glittering international rendezvous.

The "Stork Club" is produced by Jess Kimmel and directed by Rai Purdy.

Agency for the sponsor is Batten, Barton, Durstine & Osborn.

RESEARCH BUREAU OFFERS FREE PROGRAM MATERIAL

Watchmaker and jeweler organizations seeking interesting and worthwhile meeting program material are offered free help by the International Research & Identification Bureau, a non-profit organization devoted to extending the use of etch-marks as personal identification in cases of disaster.

The Bureau has prepared a series of 49 2x2-inch slides, showing and explaining identification problems, from police records, in actual cases of mass and individual disaster. All show the real helpfulness of etch-marks on metal objects on or about persons who have died or been killed in fires, drownings, accidents or cases of murder. The etch-mark is useful in both peacetime and when there are war and bombing threats.

A booklet accompanies the slides, providing a complete lecture to go with them. Slides are grouped and each group tells a complete story. Minimum meeting time needed, using only a portion of the slides, is 20 minutes. With the lecture, the full series requires about 45 minutes.

A 2x2 slide projector will be needed for the showing. If no member of the organization has one, usually a projector can be rented for a small sum from a photo dealer. Only expense to the organization is the letter it takes to arrange to borrow the slides, and return postage in sending them back. Slides are sent postpaid to the organization wanting to use them.

Arrangements for this program may be made, or further information secured, by writing International Research & Identification Bureau, 134 South Fairfax Avenue, Los Angeles 36, California.

HAMILTON RELEASES ILLINOIS AUTOMATIC MODEL

A new, smartly styled, automatic model featuring the finest precision-made, shock resistant, self-winding movement has been introduced for the Christmas shopping season by the Hamilton Watch Company under the Illinois label.

The Illinois Automatic precedes the introduction by Hamilton of a complete Illinois line early in 1953. The fine 17 jewel movement of the Illinois Automatic is manufactured to Hamilton's exacting specifications and is carefully timed, cased and adjusted at the Hamilton factory in Lancaster, Pa. Its modern gold-filled case is distinctively styled for all-purpose wear. The dial typifies the latest concepts in functional design with the minute track inside the numeral and marker track. The Illinois Automatic retails for $71.50 F.T.I.

The Illinois Automatic is handsomely packaged in a green leatherette, dual-purpose box that opens into a pop-up display and shows the watch advantageously in the show window, showcase or wall display case. An eye-arresting green and gold foil counter or window background is available to display the Illinois Automatic and box. Attractive newspaper advertising mats introducing the Illinois Automatic are also available.

25TH ALLIED EXHIBITORS SHOW SPACE A SELLOUT

All exhibit space has been sold out for both the 25th Allied Gift & Jewelry show to be held in Dallas the week of February 15th to 19th, inclusive, at the Hotel Adolphus as well as the 17th Denver Gift &

Jewelry show to be held the week of March 1st to 4th inclusive, at the Hotel Albany in Denver, Colorado.

Mailing lists have been revised in order to have a complete coverage of all merchants expected to attend.

Entertainment plans are in the making for visiting buyers with management expecting buyers registrations to reach an all-time high. The Texas Retail Jewelers Association will hold their annual convention during the show week with headquarters at the Adolphus Hotel.

This is the 25th Allied Gift & Jewelry show and the 17th Denver Gift & Jewelry show to be sponsored by Allied Exhibitors Inc., whose officers are H. W. "Wes" Johnson, president; Joseph E. O'Sullivan, vice-president, and Mrs. Mildred M. Dalton, secretary-treasurer and general show manager.

JEWELRY INDUSTRY COUNCIL ISSUES NEW BOOKLET

How to "Increase Your Golden Circle of Customers" is the subject of a 16-page booklet published last month by the Jewelry Industrial Council for the benefit of retail jewelry salespeople.

Sparked with concrete ideas and specific examples, it is a readable and helpful piece of business writing from two points of view. First, because it is designed as a practical, down-to-earth reminder of ways to gain new customers and hold old customers, it will appeal to the experienced salesperson who wants to refresh his selling techniques. Second, it serves to illustrate the cardinal points of selling jewelry merchandise, thus offering the new salesperson effective and specific selling pointers.

"Increase Your Golden Circle of Customers" is subtitled: "Add New Customers—Get Old Customers to Return—Sell the Way Customers Like It—The Way Successful Jewelry-Store Salesmen Sell." Three prime requisites are emphasized and explored in the first four chapters: know yourself, know your merchandise and know your customers. With alert service the keynote, the remaining three chapters treat every phase of a transaction between customer and salesperson, suggesting solutions to recurring problems in a concise, logical manner.

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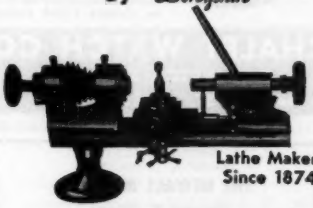
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GEMEX NAMES NEW WEST COAST REPRESENTATIVE

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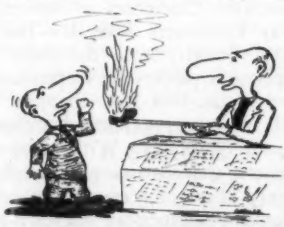
Mr. Vincent I. Mora has been appointed by The Gemex Company of Union, New New Jersey, makers of fine watchbands, as representative in their West Coast territory from Seattle to Southern California. Mr. Mora's appointment was effective Nov. 30. He will make his headquarters in Los Angeles.

People didn't wear jewelry to make them look prettier in away-back-when days. Instead they were more "practical" and kept the stones on their persons in order to preserve their health, change the weather, and obtain immortality. The Egyptians, for example, wore green jasper when they wanted it to rain, changed it for agate for protection from thunderstorms, and were sure that lapis lazuli would keep serpents from stinging. When a man died his heart was removed from his body and replaced by a scarab (a delicately carved brooch in the shape of a beetle) which was supposed to make his soul forever immortal. The Greeks went one step further: They took precious stones, ground them to a powder, and swallowed them like medicine. Jasper would prevent epilepsy, amber was good for eyes that were sore, and coral was supposed to cure throat irritations. While King Canek who ruled Portugal in 600 A.D. kept solid silver buckles on his knees at all times. He believed this would surely relieve his rheumatism. Not to mention the fact that the ladies who lived in the late 16th century in Spain wouldn't dream of going out before donning petticoats that were stiff with semi precious stones and brassieres that were replete with silver decorations. This was supposed to prevent them from sneezing, sniffling, coughing and catching colds in general.



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